SOCIAL SCIENCES

INDUSTRIAL MEDICINE

Industrial Health, Occupational Diseases and Traumatic Surgery

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—The Personal Factors of Accidents—

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— Report of Royal College of Physicians —

Medical Service in Industry
— Canadian National Railways —

Non-Occupational Absenteeism
— A Statistical Analysis —

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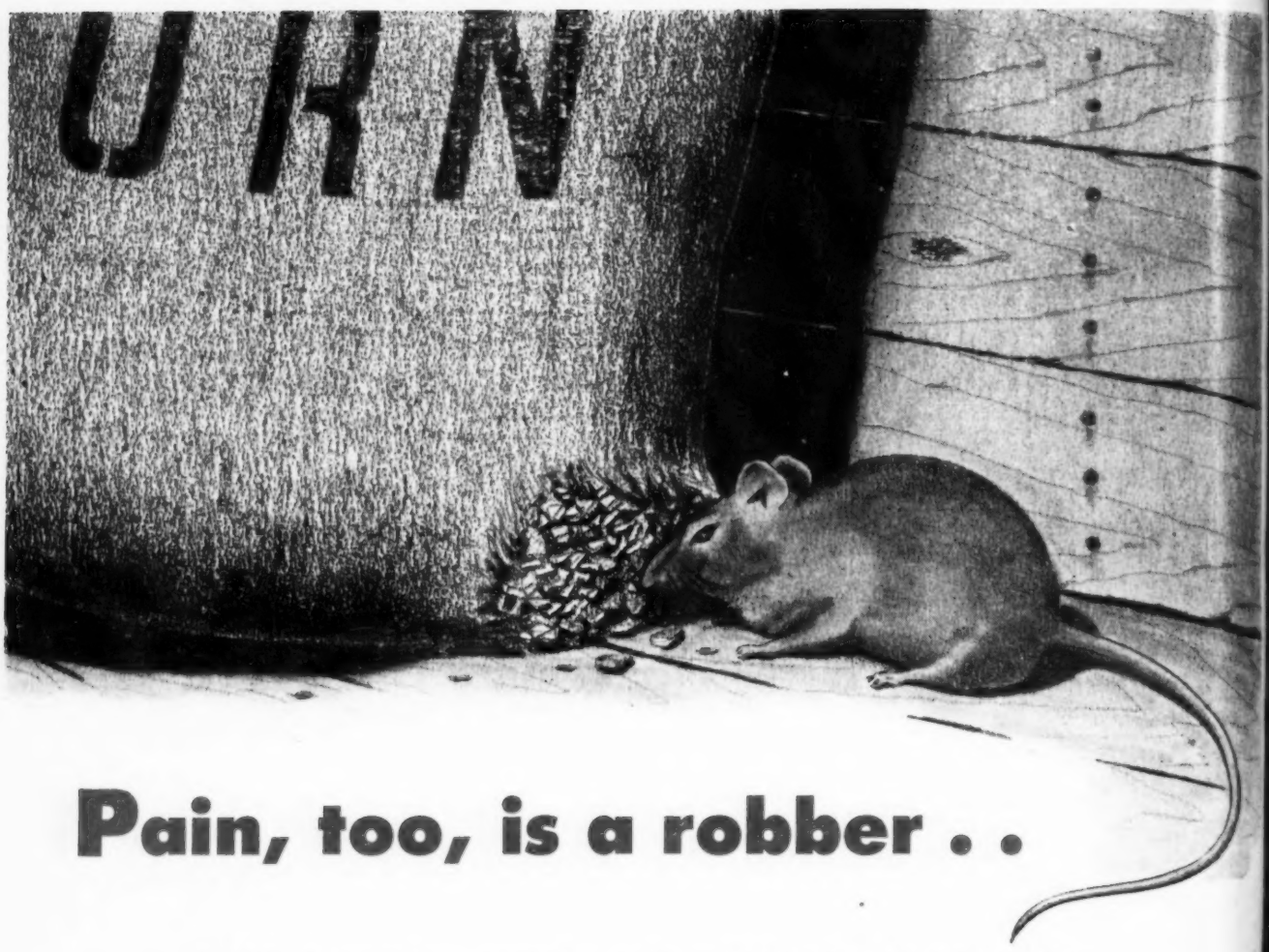

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DRS. HARVEY and LUONGO, in their careful study of the personal factors of accidents (page 377) find that, with 80 to 90% of accidents "definitely in the sphere of industrial medicine . . . industrial physicians can and should fully participate in accident prevention in industry." That they *can* participate with outstanding effectiveness is well demonstrated in the fine safety records where the industrial physician is Medical *and* Safety Director (see, for example, the first three-time National Safety Council award to DR. THOMAS DOBBINS, of Servel, page 447). That they *should* participate is conclusively proved in the present masterful study. These authors had an interesting and informative article entitled "A Comparative Study of Accident, Experience, Production and Efficiency, Sick Absenteeism and Turnover among 2,858 Physically Impaired and 5,523 Able-bodied Workers in Government Industry," recently published in *J.A.M.A.* (127:14, 902-907, April 7, 1945, and 127:15, 961-970, April 4, 1945). This, too, is an important study, timely and useful in the almost universal need for more knowledge as to what can be done by employees with limited working capacity. A significant and grateful feature of their presentation is the fact that the authors refer to the subjects of their inquiry as "Physically Impaired." An excellent term. We continue to urge its universal adoption. . . . DR. FULTON'S discussion of "the policy of the Baltimore General Motors Medical Department" (page 394) interpolates reference to "the discovery of what was termed a 'health barometer' in the British Isles" (page 396). DR. FULTON is too modest, however, to state that he might well have had much to do with this discovery. Remember his classic on "Records —The Seeing-Eye of Industrial Medicine" (INDUSTRIAL MEDICINE, 13:1, 1-45, January,

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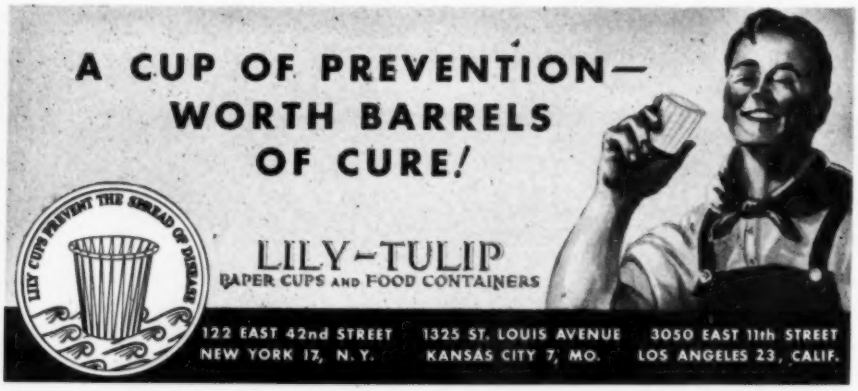

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1944), in which he developed his "Medical Severity Index." Regarding it he said: "Based on a professional judgment of actual sickness and derived from an all-age cross section of local population, this Medical Severity Index bears some important relations to the science of public health. Its curve shows striking resemblance to that produced by public morbidity and mortality statistics. Observation and comparison over a number of years have caused us to go on record in many instances in forecasting epidemics that subsequently were noted by public health authorities and the press. . . . In relation to the national health, the course of this curve is in line with the general observations published by the U. S. Public Health Service. ...It would be drawing a long bow to say that such a measure would point out a specific malady as epidemic. We do say, however, that it is an excellent indicator of a general health trend, and our past experience and observation enable us to spot an epidemic rise or general 'good health' fall. Who knows? Perhaps in some such universally adopted system industrial medicine may have the opportunity of being a cooperative partner with public health departments. Based on minor non-reportable morbidity, easily accessible and unique to industry, a veritable Weather Bureau of National Health may be built; a bureau capable of storm warnings of impending epidemics; able to fix the storm centers, trace their direction and movement, and anticipate their course; do all this before the storm of reportable morbidity and mortality has struck. A modicum of effort could put this conjecture to the test". . . . BERT HANMAN'S superlative analysis of how best to match the physical capacties of workers and jobs, published here for the first time (page 405), has already created tremendous interest wherever it has become known. The new technique explained in Chapter VII (page 418) is being filmed by Technifilm Corporation, of Hollywood. This movie is to have its "premier showing" in Washington, D. C., and will thereafter be available to industrialists. Reprints of this study will also be available.

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PERSONAL

CAPTAIN HENRY H. KESSLER (MC) was honored at a luncheon given by the Newark Advertising Club April 11, and designated the city's outstanding citizen of 1944. Among the 850 persons who attended the luncheon was REAR ADMIRAL WILLIAM J. C. AGNEW (MC). CAPTAIN KESSLER, now in charge of amputation cases at the U. S. Naval Hospital, Mare Island, California, formerly served as director of the New Jersey Rehabilitation Clinic. A feature of the luncheon was a presentation to CAPTAIN KESSLER of a citation of merit from the National Department of Disabled American Veterans.

—*J.A.M.A.*, April 28, 1945.

DR. PAUL A. BREHM, Director, Industrial Hygiene Division, Wisconsin Board of Health, addressed the Industrial Safety Council of West Allis, March 26, on "Industrial Dermatitis."

DR. CHARLES PAUL AUSTIN, Chief Surgeon, Phelps Dodge Copper Company, Morenci, Arizona, is the new president of the Arizona State Medical Association, having taken his office in April. DR. AUSTIN received his medical education at Loyola University, Chicago, graduating in 1912. He served as a medical officer for two years during World War I. Prior to locating in Arizona in 1919, he practiced in Little Rock, Arkansas, and El Paso, Texas; his work in Arizona has been in industrial practice. He holds membership with the American Medical Association and the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS. In the Arizona State Medical Association, he has served on the Committee on Industrial Health and Industrial Relations. He was a member of the Medical Advisory Board under the Workmen's Compensation Act, and is at present a member of the Board of Silicosis under the Occupational Disease Act.

DR. JAMES G. TOWNSEND, Chief, Industrial Hygiene Division, U. S. Public Health Service, Bethesda, Maryland, is speaking on "Integration of Industrial Health into the Total Health Program" at the two sessions of the Illinois Public Health Association—at Chicago, May 16, and at Springfield, May 17.

DR. CHARLES-EDWARD AMORY WINSLOW, director of Yale University School of Public Health, has been asked by the Washington Metropolitan Health Council to survey health and hospital facilities in the Washington metropolitan area.

—*J.A.M.A.*, April 14, 1945.

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GENERAL

THE California Department of Health this year celebrates the 75th anniversary of its founding. It was established in 1870, the second department of its kind to be organized in the Union. First was Massachusetts, in the year 1869. In terms of statehood California was a brash upstart. (California was admitted to statehood in 1850, in case you've forgotten, which you no doubt have.) Organization of a health department by so young a state is an interesting commentary on the forward-looking administrators of the day.

—Northern California Union Health Committee's *Newsletter*, 2:4, April, 1945.

Employing the Disabled

FIVE of the Nation's leading industrial plants had employed 50,000 honorably discharged, disabled war veterans by the end of January and the expectation was that by March the number would have been increased to some 75,000. These disclosures were brought out in a recent issue of *Cosmopolitan* by Harry Brundidge who was reporting on companies that have done something about employment and rehabilitation. In his observations at General Motors, Ford, Bethlehem Steel, Higgins Industries and Glenn L. Martin Company, Brundidge found procedures followed these general lines: "Hire every veteran who asks for a job, regardless of mental or physical handicaps. Inquire into the ambitions and capabilities of each and place him where he can best demonstrate his ability to earn the highest possible wage."

—*Connecticut Industry*, April, 1945.

Factory Diseases

OCCUPATIONAL diseases are receiving major attention from the British medical profession. The total of scheduled factory diseases is 41 and relatively new diseases have been traced to new industries. One example is certain illnesses afflicting plastics workers which cannot be described at present for security reasons, as description of the symptoms and effects might be traced to substances whose formula for the present is a military secret. From the outset of the war, dermatitis increased so substantially that three years later the government established the Advisory Panel on Dermatitis in Industry. The number of cases in ordnance factories has been considerably reduced, but they are still four and one-half times greater than before the war. Twenty per cent of those suffering from the disease had to be removed from this type of work completely, and the balance transferred to other work. The problems created by these occupational diseases are for the most part unexplored, and it is hoped that the training of more doctors and nurses

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—From "British Health in the Sixth Year of War," British Information Service, April 25, 1945.

Royalties and Health Programs

SIDELIGHT to the effort to make it illegal for labor unions to collect "royalties" like those collected by James Petrillo, president of the American Federation of Musicians, and sought by John L. Lewis for his United Mine Workers Union is their effect on health programs supported by such royalties. A bill was presented by Senator Bailey, of North Carolina, to prevent employer payments to a union for other than union dues. If the bill is made law it would not only upset the Petrillo royalties but it would do away with many negotiated agreements whereby employers agree to pay a small portion of the payroll into health funds administered jointly by the union and the employer. These help to pay sickness and accident benefits, medical costs and death benefits. An increasing number of employers have provision for the contributions in their union contracts.

—*J.A.M.A.*, April 14, 1945.

New Foundry Code

A NEW CODE of recommended practices for the foundry industry, to foster foundry safety and hygiene, has been developed by the American Foundry Association's Industrial Hygiene Codes Committee and approved by the Association's Board of Directors. The code gives engineering data and minimum requirements for industrial housekeeping and sanitation. "Large scale employment of women in war production work has focused attention on many problems of sanitation, ventilation, housekeeping, water supply, lighting, etc. This code will provide sufficient data for protecting health and safety and promoting good industrial relations. It is a code that every foundry should have available for study and guidance, especially where women are employed." Chapters make recommendations on good housekeeping, ventilation, lighting, water, toilet rooms, wash and locker rooms, rest rooms for women, and lunch rooms. The *Recommended Practices for Foundry Housekeeping* can be obtained from the American Foundrymen's Association, 222 West Adams Street, Chicago 6, Illinois, at $1.50 per copy.

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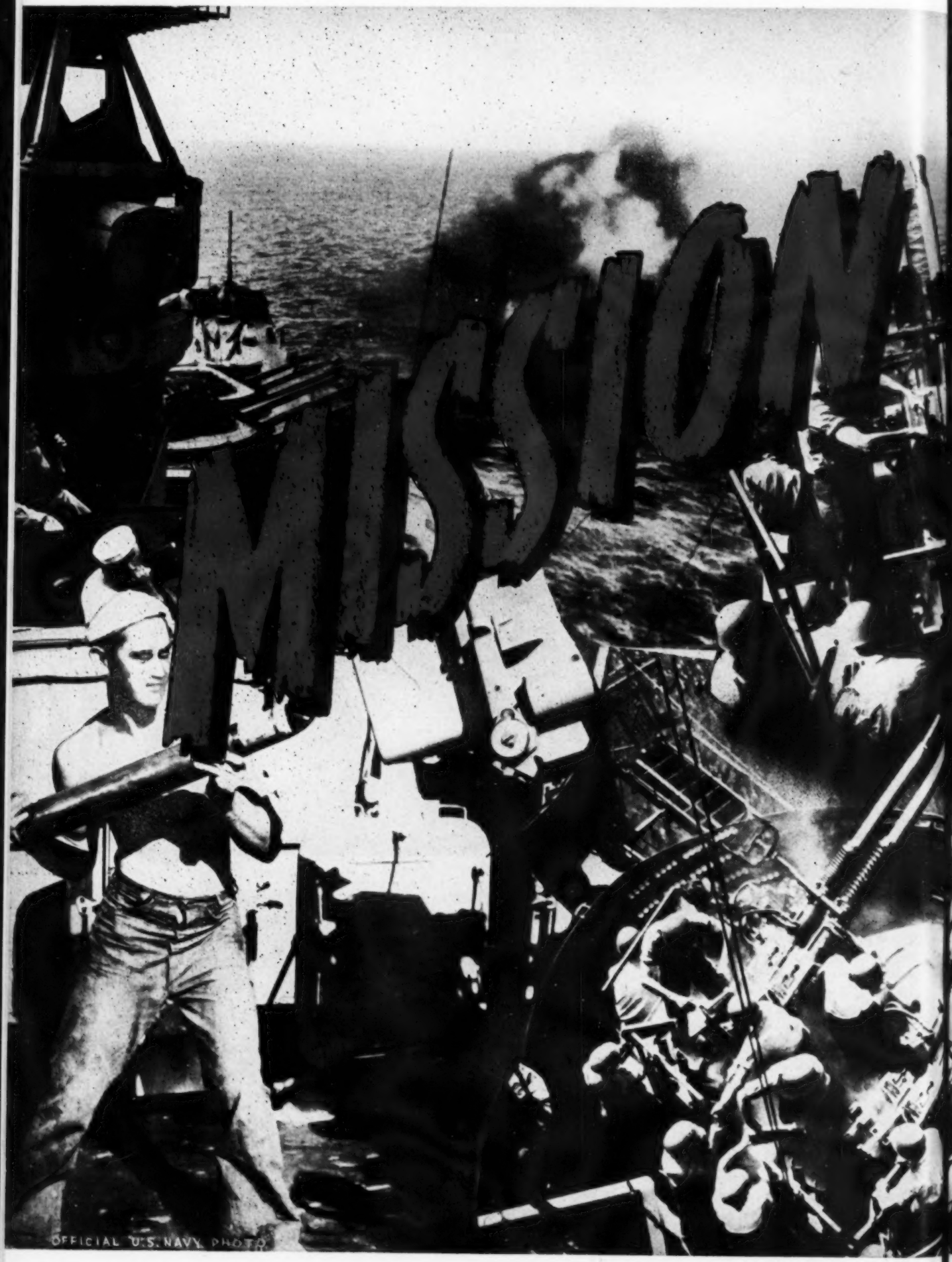
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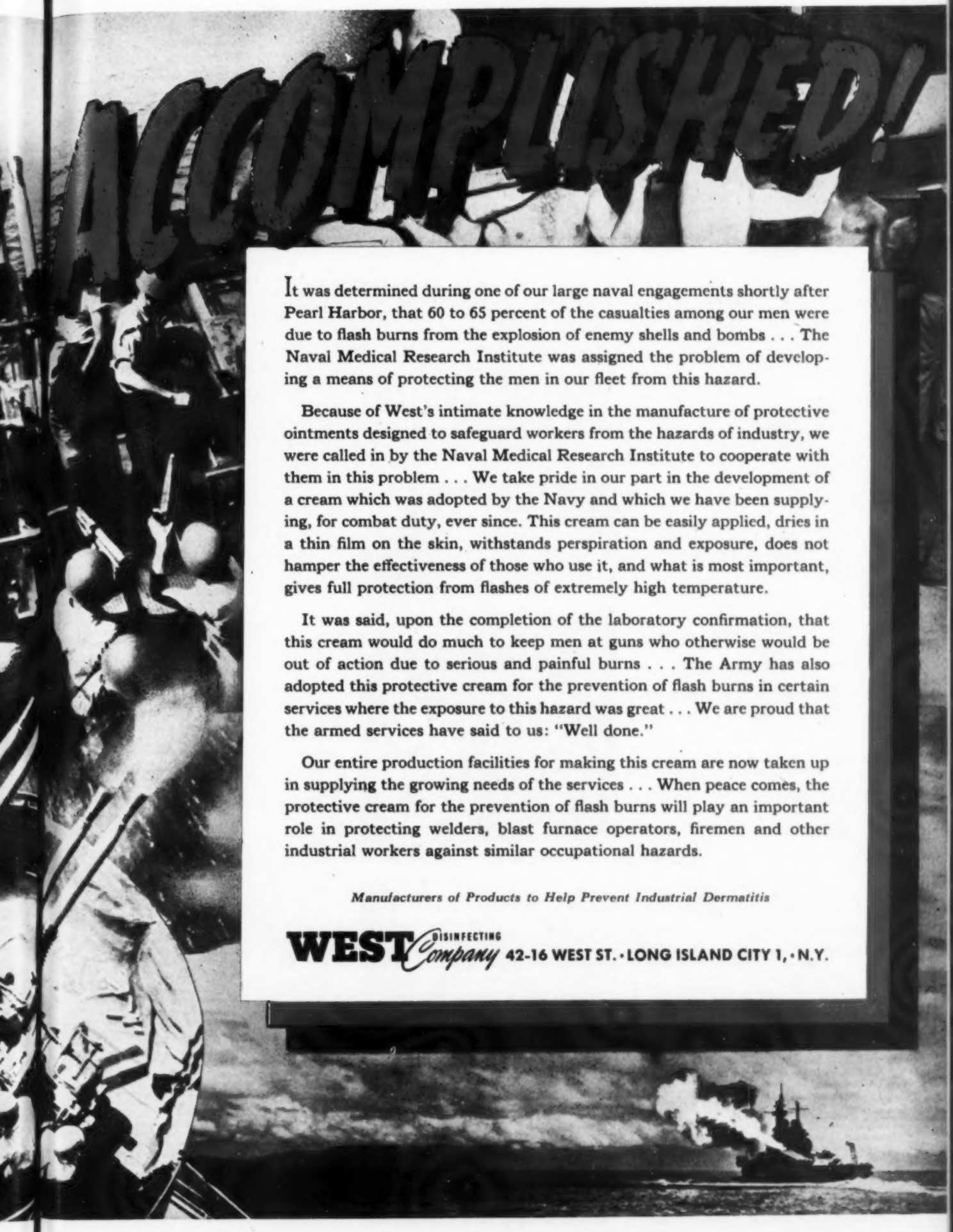

It was determined during one of our large naval engagements shortly after Pearl Harbor, that 60 to 65 percent of the casualties among our men were due to flash burns from the explosion of enemy shells and bombs . . . The Naval Medical Research Institute was assigned the problem of developing a means of protecting the men in our fleet from this hazard.

Because of West's intimate knowledge in the manufacture of protective ointments designed to safeguard workers from the hazards of industry, we were called in by the Naval Medical Research Institute to cooperate with them in this problem . . . We take pride in our part in the development of a cream which was adopted by the Navy and which we have been supplying, for combat duty, ever since. This cream can be easily applied, dries in a thin film on the skin, withstands perspiration and exposure, does not hamper the effectiveness of those who use it, and what is most important, gives full protection from flashes of extremely high temperature.

It was said, upon the completion of the laboratory confirmation, that this cream would do much to keep men at guns who otherwise would be out of action due to serious and painful burns . . . The Army has also adopted this protective cream for the prevention of flash burns in certain services where the exposure to this hazard was great . . . We are proud that the armed services have said to us: "Well done."

Our entire production facilities for making this cream are now taken up in supplying the growing needs of the services . . . When peace comes, the protective cream for the prevention of flash burns will play an important role in protecting welders, blast furnace operators, firemen and other industrial workers against similar occupational hazards.

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Doctor Keeps Job

ACCORDING to the *Journal of the Medical Society of the County of New York* the United States Circuit Court of Appeals for the Third District, in its first decision construing terms of the amendment to the Selective Service Act which requires employers to reinstate returned veterans to their jobs, ruled recently that a medical director for an industrial corporation is *an employee within the meaning of the law* and entitled to his old job after discharge. The unanimous decision, written by Judge William H. Kirkpatrick, orders the General Cable Corporation at Perth Amboy, New Jersey, to reinstate a Perth Amboy physician as the company's medical director. The company refused to rehire him, claiming that he was an

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TO provide an organization, not for pecuniary profit, in which all agencies and societies, both medical and lay, concerned with the problems of industrial health can hold membership and can meet together in conference for the study, discussion and careful consideration of all industrial health problems and procedure; to engage in scientific research to determine the cause, nature, prevention and cure of diseases and injuries of occupations; to assist in establishing and supervising industrial health clinics to serve small industries; to establish and maintain hospitals which will furnish facilities for the care, treatment and study of occupational injuries and diseases; to make surveys of industrial medical services and recommendations for their improvement; to solicit, receive and administer funds for any purpose that will advance and/or improve industrial health; to establish undergraduate and/or post-graduate courses in industrial medicine and surgery and/or to cooperate with medical schools and industries in maintaining such courses; and to use all those means, which from time to time, may seem wise, for the advancement of industrial health.

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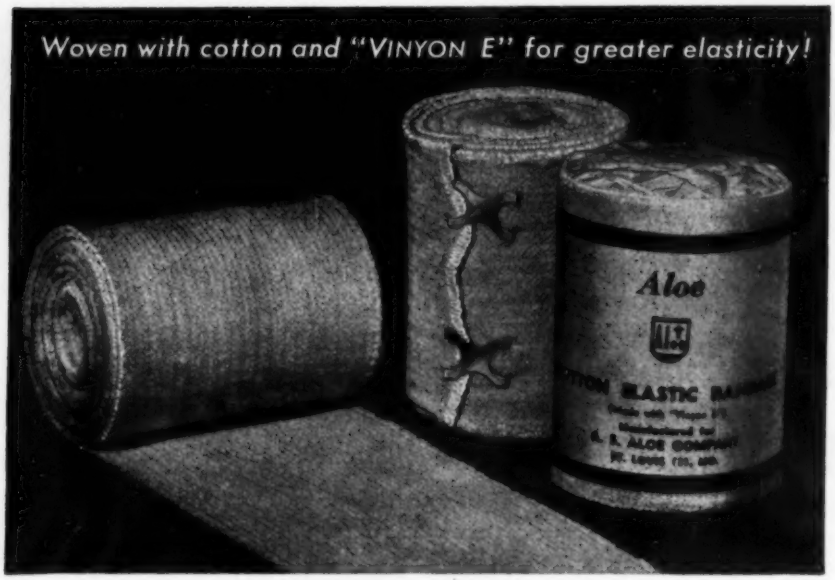

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Provides even, uniform, steadily maintained pressure—remains elastic

Aloe cotton elastic bandages are woven of long staple cotton and "VINYON E"—a vinyl resin yarn—which has been found to produce a superior type of elastic bandage because of its natural elasticity. These improved elastic bandages will provide even, uniform, easily controlled and steadily maintained pressure in all conditions where an elastic bandage is indicated. High quality feather-edge prevents binding. Special weave permits free movement, ventilation and circulation. Unlike most other elastic bandages, Aloe cotton elastic bandages with "VINYON E" do not have to be washed daily in order to retain their elasticity. Washing need only be done when bandage becomes soiled. Each size bandage listed below measures approximately 5½ yards when stretched and is furnished with two metal clips in cellophane wrapped and sealed package.

	Each	Per Doz.
HH5934—Aloe Cotton Elastic Bandage with "VINYON E," 2-inch width	**$0.63**	**$ 6.30**
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HH5937—Same, 4-inch width	**1.12**	**11.25**

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independent contractor rather than an employee; the employees' health association for which he had been medical examiner had engaged another physician and refused to take him back, and alleged that there would be "loss of efficiency" and "additional expense" if separate doctors were employed by the company and the employees' association. Judge Kirkpatrick ruled that the law does not say that a returned veteran must have been an employee, but is intended to protect the "status quo" of that veteran in whatever position he held prior to his service in the armed forces of his country. As to the company's contention that there would be "loss of efficiency" and "additional expense" if separate doctors were employed by the company and the employees' association —the court held that such a claim, if upheld, "would defeat the main purpose of the act and limit its operation to merely capricious or arbitrary refusals."

—Connecticut State Medical Journal, April 1945.

Abbott Plan

S. DEWITT CLOUGH, president and general manager, announces a plan for payment of physicians' bills for employees of Abbott Laboratories, North Chicago, Illinois. Employees will be reimbursed for physicians' bills incurred in the hospital, at home, or at the doctor's office. The entire cost of the program, which will benefit approximately 2,800 employees of the laboratories and its 17 branches in the United States and Canada, will be paid by the company. Under a medical expense plan, which is underwritten by Equitable Assurance, an employee will be repaid up to $2 for each visit to a doctor's office or at a hospital and up to $3 for each visit by a physician to the employee's home. Payment will be limited to one visit each day and to a maximum of 50 visits in any one calendar year.

Medical Services in Industry

UP TO December 31, 1944, a total of 1,900 different industrial establishments representing over 5,345,000 employees had been surveyed from the standpoint of medical service. Of these, 1,137 or 60% were fully or provisionally approved on that date. The Minimum Standard for Medical Services in Industry, a progress report on this activity, a resume of the working principles of an adequate industrial medical service, and a list of the 1,137 approved medical services in industry, in the United States and Canada, appear in the December, 1944, Approval Number, (pp. 469 to 484).

—Bulletin of the American College of Surgeons, February, 1945.

Expanding Program

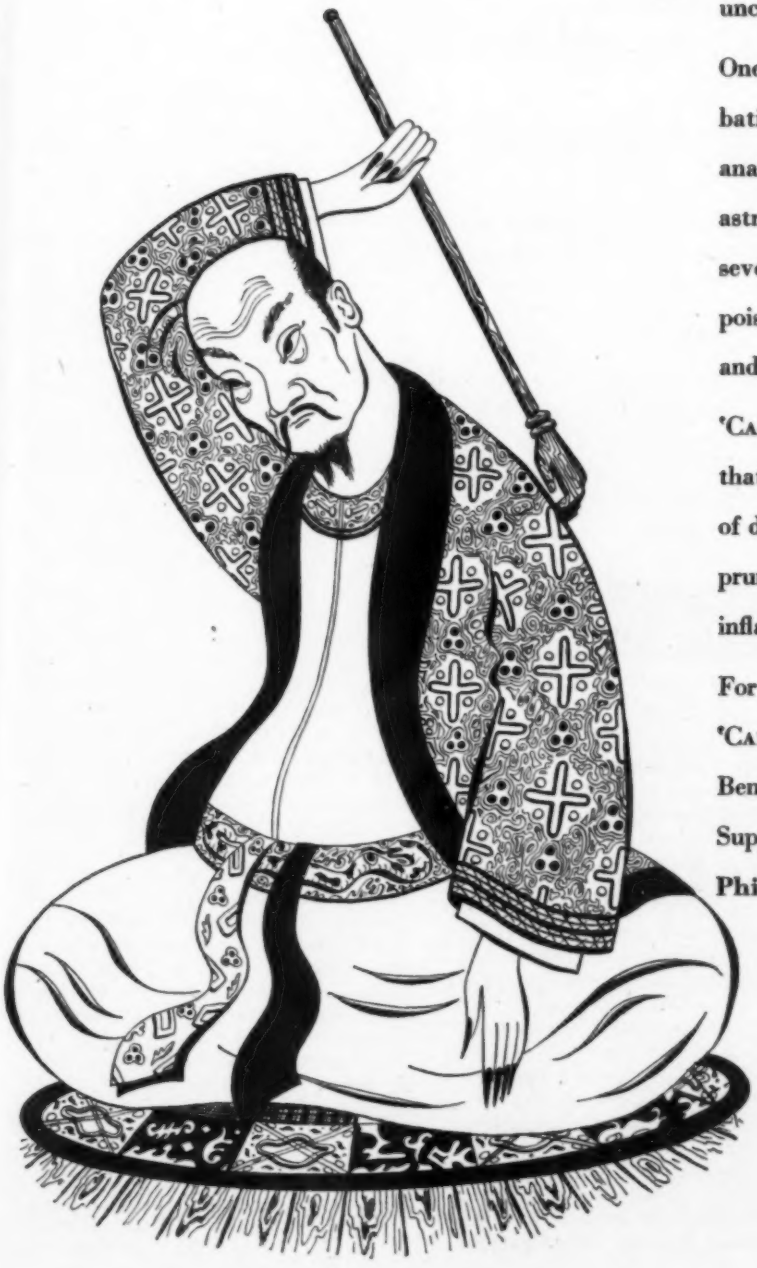
IN WISCONSIN Medical Society's, "1945 Suggested Budget": "Medical Procedures in Industry—This title has been broadened to indicate a more comprehensive responsibility than 'pre-employment examination,' etc. There is every indication that 1945 will see the promulgation of a model industrial health program supported by the various groups interested. Problems will involve not only examinations, but also proper placement, the industrial nurse, follow-up activity and the like. There may be some activities pertaining to veteran and civilian rehabilitation."

—Wisconsin Med. J., April, 1945.

Caterpillar's Year 1944

WAR gave added importance to good health. By assisting employees in keeping fit, the medical program kept pace with the national need for uninterrupted work. Because of large numbers of new and part-time employees, a total of 18,467 physical examinations were made. In many instances, ailments were discovered which might have become serious had they been neglected. First aid visits also rose from 148,119 to approximately 189,187. But these figures only emphasize that nearly everyone recognized the importance of receiving prompt medical attention for even minor scratches and ailments, on the sound basis that it is better to go to first aid today than to a hospital tomorrow. When sought by employees, confidential advice was given in matters of general health. As a result, scores of employees were able to enjoy better health and physical fitness. Our company was one of the first industrial organizations in Illinois to open its doors to the U. S. Public Health

the Chinese Back-Scratcher is out of date . . .



Yes, hopelessly out of date . . . because regardless of how popular and self-satisfying the Chinese back-scratcher may be . . . it is no guard against secondary infection which frequently results from uncontrolled scratching.

One of the safest and most effective methods of combating pruritus is the application of 'CALIGESIC' analgesic calamine ointment. Its protective, astringent, anesthetic, analgesic properties relieve the severe itching which accompanies ivy and oak poisoning and insect bites. It does not stain the skin and is safe to use on children.

'CALIGESIC' ointment is a greaseless, bland ointment that affords prompt, welcome relief in the treatment of dermatitis venenata, summer prurigo, pruritus ani, pruritus scroti and other irritations and inflammations of the skin.

For external application only, each 100 Gm. of 'CALIGESIC' ointment contains: Calamine, 8.00 Gm.; Benzocaine, 3.00 Gm.; Hexylated Metacresol, 0.05 Gm. Supplied in 1½ ounce tubes. **Sharp & Dohme, Philadelphia 1, Pa.**

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SIX REASONS WHY

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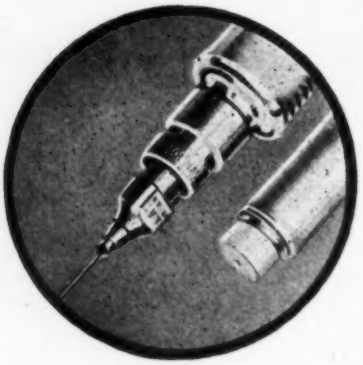

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Service in its national tuberculosis survey. When the announcement was made, employees were quick to take advantage of the opportunity for free and voluntary chest x-rays. Results of the survey at "Caterpillar" were extremely gratifying. We were informed by the authorities that the number of cases of tuberculosis discovered in all categories was considerably lower than in other industries, 0.83% against the national average of 1.3%. The number of active cases was also small, approximately 50% of the national, country-wide average.

—From "The Year 1944," Caterpillar Tractor Co.

Model Industrial Health Act

THE proposed Industrial Health Service Act prepared by U. S. Public Health Service as a guide for state legislatures consists of 12 sections. Parts one, two and three establish the health service and empower the Commissioner of Public Health to create and maintain industrial hygiene services. The services are authorized to study conditions which may affect industrial health. Section four provides authority to adopt rules and regulations which shall have the force of law. The regulations include maximum allowable concentrations, ventilation requirements, sanitation, etc. Free access to investigate conditions in any firm or industry is provided in section five. Any obstruction of entrance is a violation of the Act. A mechanism of fines for violations is established in section nine. The information gathered from studies is protected from use in actions at law in section six. An exception is allowed where special investigations are made for the administrators of the Workmen's Compensation Act. Section seven makes it a violation for any employer to use a material or to allow a process or condition known to affect health adversely unless safeguards are used. The Industrial Hygiene Division would evaluate and determine whether adequate protection is provided. Reporting of all occupational diseases is required as defined in section eight. Funds for the administration of the Act would be provided under authorization of section 10. The protection of the legality of the Act and the separate consideration required for each clause are defined in sections 11 and 12.

—*Industrial Hygiene Digest*, 9:4, April, 1945.

Check on Absenteeism Causes

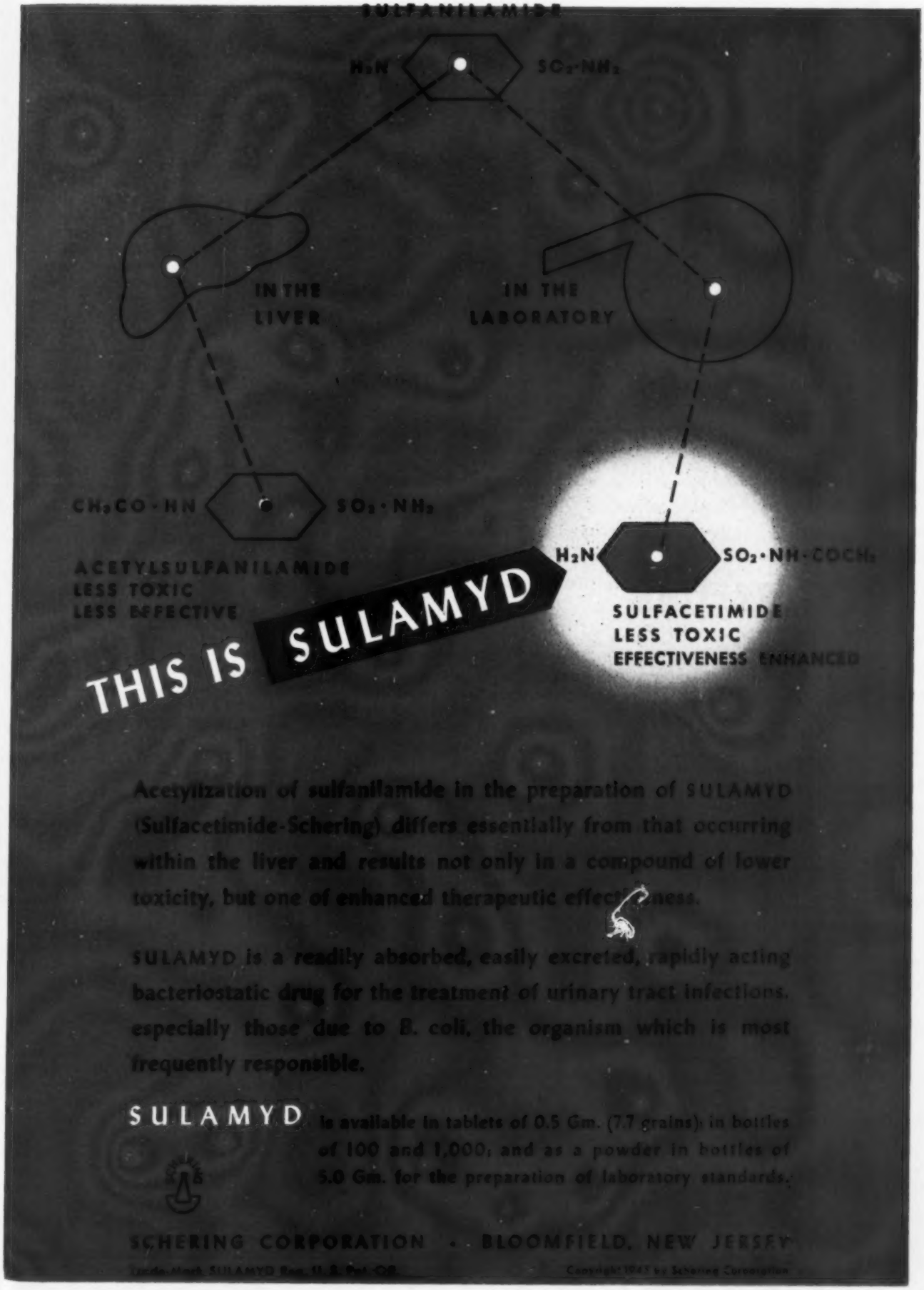
AT THE Lincoln Electric Company plant in Cleveland, in addition to an incentive system, absenteeism is further decreased by an innovation in the time-card system. Employees pick up their cards at the gate and carry them to their departments, where they ring in. Twenty minutes after starting time, all cards remaining in the rack at the main gate are removed and taken to the personnel office. Each card removed is replaced in the rack with a red card with blanks for tabulating reasons for tardiness or absence, physician's report, etc. The late or absent employee must present the card and be interviewed by the personnel director before returning to work. This system has aided the company in reducing absenteeism to the low figure of between 1.5% and 2%.

—*Factory Man. & Main.*, 102, 105, November, 1944; abstr. in *Industrial Hygiene Digest*, 9:4, April, 1945.

GM Health and Safety

IN MAY, General Motors became the first two-time winner of the National Safety Council's special wartime award for Distinguished Service to Safety. Throughout the year employee safety was promoted aggressively. Likewise, consistent efforts were made to protect the health of employees. The low 1943 accident record was equaled in 1944. The number of days lost per 1,000 hours worked was at the low rate of 0.47 for the year. Loss of time due to occupational diseases has been practically eliminated. The corporation's position in the fields of accident prevention and health protection has been attained as a result of many years of organized and persistent educational work together with the cooperation of the employees themselves. In 1944, approximately $11,400,000 was devoted to safety and health protection. The excellent record in worker protection was achieved despite the disruptive influences of wartime, the unusually heavy turnover of employees and the large proportion of unfamiliar tasks.

—Annual Report for 1944, General Motors Corporation.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Acetylization of sulfanilamide in the preparation of SULAMYD (Sulfacetimide-Schering) differs essentially from that occurring within the liver and results not only in a compound of lower toxicity, but one of enhanced therapeutic effectiveness.
SULAMYD is a readily absorbed, easily excreted, rapidly acting bacteriostatic drug for the treatment of urinary tract infections, especially those due to B. coli, the organism which is most frequently responsible.
SULAMYD is available in tablets of 0.5 Gm. (7.7 grains); in bottles of 100 and 1,000; and as a powder in bottles of 5.0 Gm. for the preparation of laboratory standards.
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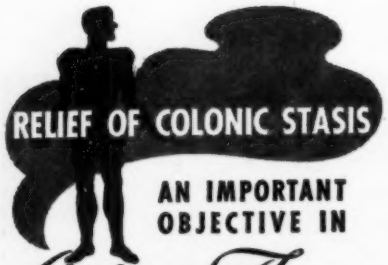

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COMMENT and OPINION

The Kind of Job

THE industrialization of New Zealand is proceeding apace, and during the past few weeks I have encountered in factories most of the substances which I have mentioned tonight. Moreover, new substances and new risks are constantly arising. The pure science of today is technology of tomorrow, and it is up to the medical man to consider always the possibility of an occupational cause or an occupational influence even when the diagnosis seems obvious. And do not forget that the occupational history to be of value must be complete. "Labourer" means nothing. A farm labourer may be exposed to the risk of anthrax, but a gas-works labourer is more likely to develop a tar-cancer. Remember, of course, that not nearly so many persons are employed in so-called "dangerous trades" as in ordinary hot and laborious jobs, or in safe, nonstrenuous, but monotonous and tiring work. In fact, only a small portion of workpeople are exposed to the sort of risks which I have described, but we have a more precise knowledge of the action of poisons, and therefore perhaps a greater responsibility in preventing their ill-effects.

—From "Modern Industrial Toxicology," by DR. J. M. DAVIDSON, *in New Zealand Med. J.*, October, 1944.

Absentee Problem

PRIVATE and industrial physicians have again been urged to cooperate in cutting down plant absenteeism—this time by the Safety and Security Division, Army Service Forces. "Private physicians," it points out, "often have no accurate information concerning (1) health hazards associated with their patients' jobs in ordnance plants, and (2) the generally satisfactory medical and engineering measures taken for their control. They are often at a loss, therefore, regarding complaints related to work. Likewise, private physicians are not generally aware of the information concerning their patients available from the plant physician in connection with examinations, blood tests, x-ray findings, and other diagnostic aids. The government and its contracting agents customarily require a medical certificate to cover an absence alleged to have been due to illness, or a labor termination attributed to reasons of health. The medical profession is then put under pressure by thoughtless persons who see little harm in collecting disability benefits or in obtaining better jobs by feigning illness or disability. Responsibility rests squarely on the physician to act as prosecutor, defense attorney, and judge before issuing such a certificate. He fails himself, his profession, and the war effort if certificates are issued without due cause."

—*Medical Economics*, April, 1945.

Prepaid Medical Service

A COMPARISON of two Governors' messages to their Legislatures is worthy of observation. In California, Governor Warren said: "It is now generally agreed that we cannot bring proper standards of health to the people of every community through voluntary programs. We have had enough investigation and enough talk to be ready for action." Governor McGrath, of Rhode Island, said: "It is obvious that no plan of universal prepaid hospitalization or health care can be put into effect until we are sure that the services for which prepayment is made can be met by adequate facilities." Rhode Island was the first and still is the only state that has enacted a cash sickness law; a 1% contribution by employees. It is not considered successful at present because the payments exceed the income. This is due to administrative difficulties. Workers whose illness is connected with an occupation may receive aid from both the workmen's compensation and the cash sickness fund. Maternity claims exhaust their credits by taking advantage of a sickness period oftentimes running to five and six months. Governor McGrath, in his message to the Legislature, has called attention to the need of a review of the financial situation of the fund and the necessity of certain changes to protect the plan. Eleven states have introduced bills to permit sickness compensation, and most of them are sponsored by labor.

—*Connecticut State Medical Journal*, April 1945.

High Blood Pressure

FROM the Medical Department of Westinghouse Electric and Manufacturing Company; published by the Company as a contribution to the better health of its employees: "NORMAL BLOOD PRESSURE: The range of normal blood pressure is fairly wide. That part of the pressure with which the patient is usually familiar and which is known to the doctor as the 'systolic' pressure, varies normally, from 95 to 145. There is another measurement of the blood pressure which the physician knows as the 'diastolic.' The range usually accepted as normal is from 60 to 90. Often the diastolic pressure is of more significance than the systolic. It should be noted that there are many conditions aside from disease which temporarily affect the blood pressure. The systolic pressure rises to a slight degree following meals; it rises also as the result of strong emotion such as excitement, anger, or fear. Strenuous exercise.

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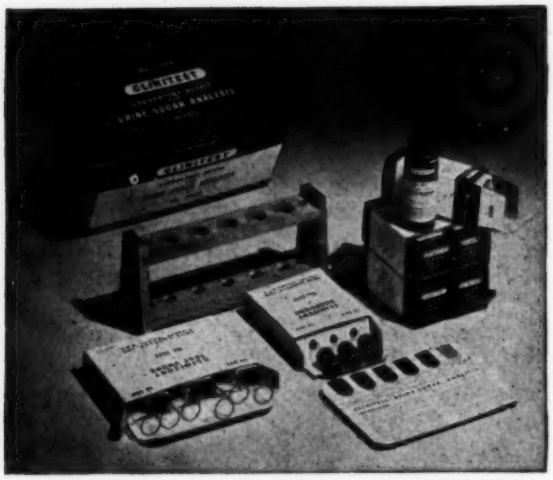

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also raises it. Undisturbed sleep lowers it. HYPERTENSION: The exact cause of hypertension — or 'high blood pressure'—cannot always be determined. However, there are many known conditions of which it is an important part. It is found, for example, in some abnormalities of the urinary system, in a form of thyroid disease, in certain tumors, and in several other conditions. Overweight may be associated with high blood pressure. Heredity may be a predisposing factor. It is believed by some clinicians that probably the chief factor in hypertension is the kidney. One theory states that whenever, because of any cause, there is interference with the blood supply to the kidney, a substance is produced by this organ which results in an elevation of the blood pressure. THE COMMON TYPE OF HYPERTENSION: In the majority of cases of hypertension there is no detectable cause for the condition. Frequently, the only abnormality found is the elevation of blood pressure. Many of these patients show a gradual increase in their blood pressure over a period of years. In the early stages they simply show an unusually high blood pressure under conditions of nervous tension. These elevations are only temporary at first but later a persistent hypertension may develop. TREATMENT: Despite the fact that the basic cause of the trouble may be obscure, much may be done for hypertensive patients if they place themselves under appropriate care. The patient with high blood pressure must, above all, be willing to observe the rules of rest, activity, and diet suitable to his particular case. Medical advice should be followed. Irrational diets advised by friends and neighbors who consider themselves good medical counselors are to be avoided. No self-medication should be attempted. All drugs used should be obtained on medical prescription and while taking them the patient should be under the physician's supervision. At times, special procedures are required in treatment. The control of diabetes, the reduction of weight, certain forms of surgery, or medicines for the improvement of contributory conditions may be necessary. It must be remembered that the treatment of hypertension is a complicated matter and requires expert medical care. THE PATIENT AND HIS BLOOD PRESSURE: The patient with high blood pressure is, as a rule, greatly interested in his exact pressure. He attributes great significance to any fluctuations and measures his progress by them. This is usually an error. A more reliable index is the physician's appraisal of the patient's condition. Only rarely does the patient possess the technical information which enables him to interpret the meaning of his blood pressure at a particular time. Indeed, so many factors must be considered that an intelligent evaluation of the meaning of one's own blood pressure is an extremely difficult accomplishment. More important than knowing the exact figure is to know what the doctor thinks of the patient's condition and what he wants the patient to do about it."

Occupational Health

OCCUPATIONAL health programs begin with the employment of workers. It is the duty of the plant physician to evaluate the individual from the point of view of proper placement for a given job. This activity is known as the placement examination. It is necessary then to follow through and check up as to whether the individual is properly placed—that is, whether the worker fits the job and the job fits the worker—from the point of the physical, mental and emotional pattern of the individual. In addition to the placement examination, it is necessary also to have a total health evaluation of the worker, and for the individual to be checked at intervals to determine whether he continues in good health. Next in importance is to make sure that the working conditions are healthful in nature. This is accomplished by observation of the operations and processes connected with the job, and a study of the atmosphere, with reference to contamination, as well as a study of the various substances with which the individual comes in contact. In thus evaluating the exposures and the working environment, an appraisal is made of potential health hazards. The first of these activities requires a specially trained medical man, and the second, a properly trained engineer. For the convenience of designation, the particular talents

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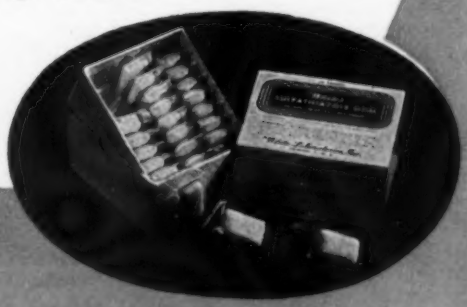

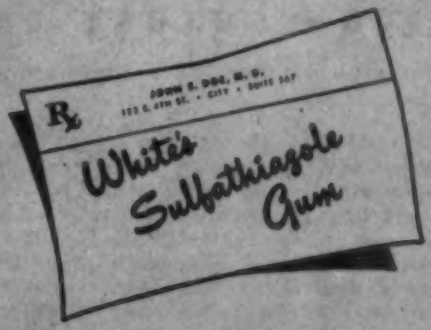

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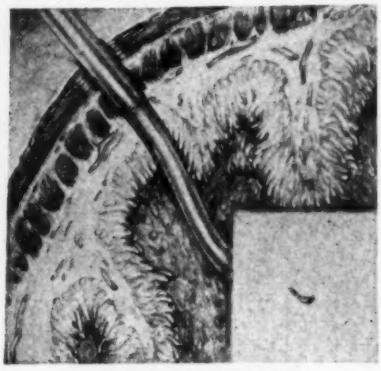

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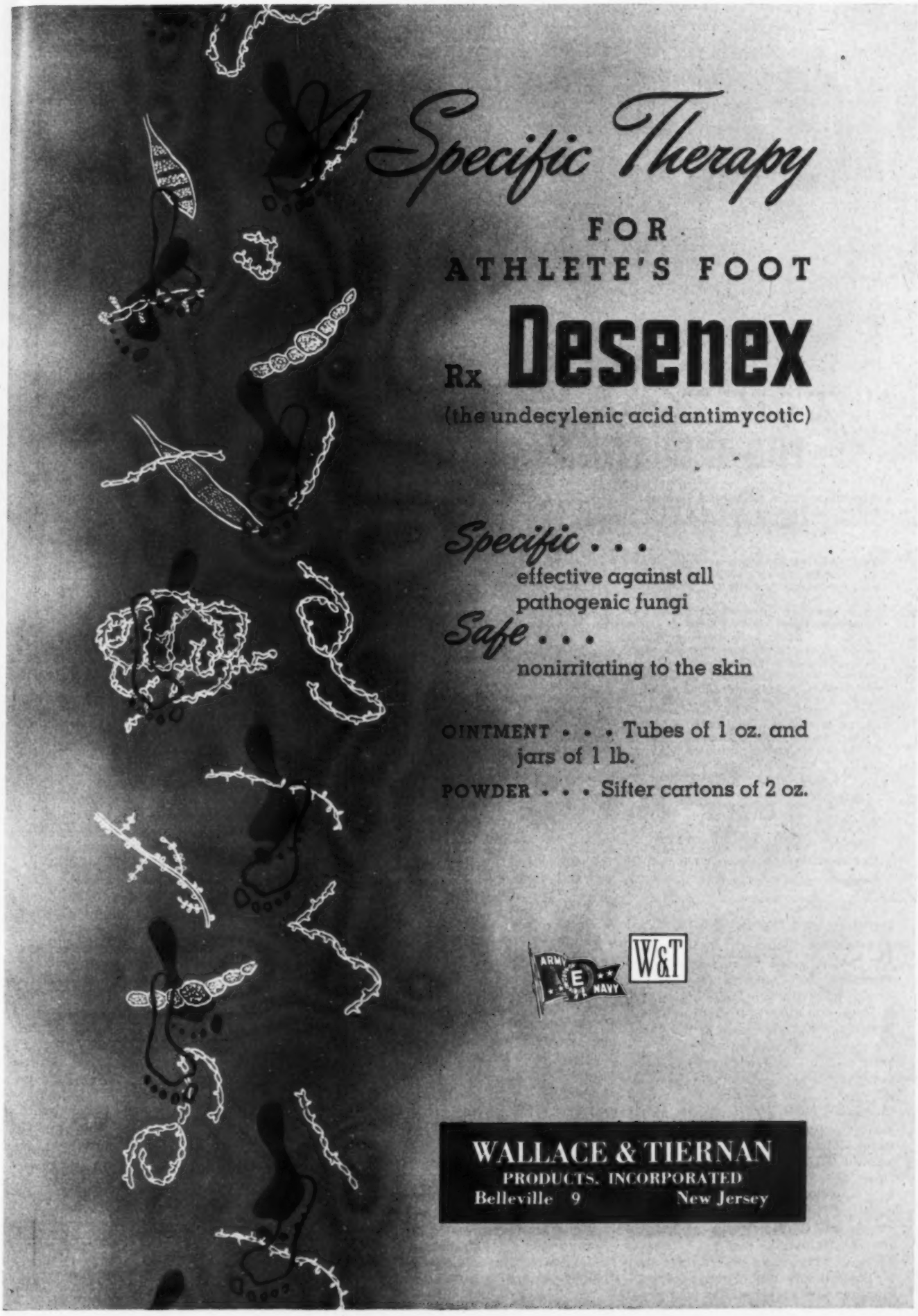
required fall into the groups of preventive medicine and preventive engineering. Indeed occupational health practice is preventive medicine in contrast to diagnostic and therapeutic procedures followed in the general medical practice. There is a real need for clarification about the content of the field of preventive medicine. Usually, when the term is employed, it connotes activity in connection with communicable diseases. As a matter of fact, the field of preventive medicine should include the study of epidemiology and methods to eliminate or control etiological factors of disease. In addition preventive medicine should include the control of complications of disease whether they be medical, surgical, economic, social or legal. The term "preventive engineering" is employed to cover the engineering activities that have been artificially divided between the fields of sanitation, hygiene and safety. At the present time, no one individual can cover these three fields, since the requirements in one instance need an individual with chemical training, and in another instance mechanical training, for the successful fulfillment of duties. This type of engineering assistance in medicine has been needed for a long time, and its integration with the study of disease should be approached along the lines that have met success in integrating subjects, such as chemistry and bacteriology in the study of the etiology and control of disease. The physician who expects to attain success in the field of occupational health must have a working knowledge of the statistical method, and must possess a knowledge of the fundamental principles involved in insurance. The latter is true not only because of the contacts he has with workmen's compensation considerations, but because of the increasing importance of group insurance, sickness indemnification and health insurance plans that are constantly under discussion. Finally, such a physician must be an administrative officer in developing the proper relationship with employees and management, as well as understanding the design, organization and direction of health service. Perhaps the most important matter is for the physician to differentiate between the physician-employee relations, and the physician-patient relationship. The difference in these relations constitutes one of the essential features of the industrial physician, because industrial physicians should not be practitioners of medicine in the usually accepted sense. There is no educational institution today which offers opportunities for training in the correlated activities presented above. It is with this that the School of Occupational Health is particularly concerned in organizing an education program. What I have said does not carry with it the idea that the physician must not be well trained in clinical medicine; nor does it mean that special training in clinical medicine peculiar to occupations should not be dealt with. This thought is illustrated by pointing to the fields of ophthalmology, orthopedics, dermatology and traumatic surgery. All that is intended here is to indicate the subjects which an industrial physician must have as a part of his educational armamentarium, and for which at present there is no organized educational program which offers opportunities for proper training. Finally, may I say that there is an urgent need for the development of a satisfactory procedure in health appraisal of an individual. A procedure must be developed which will permit an evaluation of the physical, mental and emotional status of an individual with proper instruction to the individual of what he can best do with what he has as health assets. It is in this field of effort that psychosomatic medicine will play an important role. The essential features of the curriculum for a School of Occupational Health will include instruction in preventive medicine, preventive engineering, occupational health economics (e.g., statistics and insurance), industrial pharmacology, and also an effort will be made to promote interest and activity in research. Such subjects as nutrition, psychiatry, physical medicine, and the problems of rehabilitation are all of outstanding importance in occupational medicine.

—RAYMOND HUSSEY, M.D., in *Detroit Medical News*, March 26, 1945.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(1) Combes, F. C.: Indus. Med., July, 1944.
(2) Parkes, Morey: Indus. Med., January, 1944.

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Industry and the Psychiatrist

REFRESHER courses in industrial medicine are likely to be made available for medical officers. It would be profitable to ensure that in these due attention should be paid to the psychological side of the work. By due attention I do not mean the offer of a bird's-eye view of modern psychiatry nor a hasty outline of the theory and technique of psychotherapy. There are some less ample matters, touching on causation, detection of incipient trouble, and prompt adjustment, which could usefully be singled out and explained in a few terse lectures or frank discussions. Of course these could not supply all that it would be helpful for the industrial medical officer to know of preventive psychiatry; only a reorganized undergraduate curriculum and a systematic post-graduate course in industrial medicine could be expected to put the psychiatric aspect of industrial medicine in its proper place and perspective among the many things which the medical officers of the future will need and wish to learn. But in the meantime refresher courses could provide useful *ad hoc* information about psychiatry as about other topics.

—From "Psychiatric Advice in Industry," by AUBREY LEWIS, in *British J. Indust. Med.*, January, 1945.

Education in Industrial Medicine

VERY little academic education in industrial medicine and hygiene is available to the average medical undergraduate, and it is plain fact that there is an acute scarcity of men with suitable medical, technical and personal qualifications. Throughout the ages the tragic toll on life and health levied by occupational hazards is well evidenced, and therefore this shortage is surprising. It is still insufficiently recognized that industrial health is a composite subject comprising health, safety and welfare of man in his working surroundings, and that in practice problems of industrial health are also composite, preponderantly environmental, and requiring for their solution the services of doctors, engineers, chemists, physicists, psychologists, welfare and personnel experts, dietitians and other specialists in various combinations. Instruction for undergraduates should be of a general character, directed towards interesting them in the important influence working conditions have upon the health of the individual, in the many occupational causes of common symptoms, and in the methods of approach to problems of industrial health. A few visits should be paid to factories. A post-graduate course should qualify for a Diploma in Industrial Hygiene. Research in industrial health is, in the main, applied research. It comprises field investigation and appraisal of the need for laboratory research, and assessment of the results of field and laboratory investigations in relation to the industrial process and the prescription of preventive measures appropriate to that process. Social medicine is an academic force, whereas industrial health has specialized technical functions. There is a pressing need for closer coordination of industrial research with industrial health research, and of both with the resources of the universities in teaching and research.

—Abs. by K.M.A.P., in *British J. Indust. Med.*, January, 1945, of "Education in Industrial Medicine and Hygiene," Merewether, E.R.A. (1944), *Med. Pr.* 212: 233.

Toxicities

A FEW YEARS ago *beryllium* was designated as a somewhat poisonous substance by a few investigators, and various industrial diseases were described such as berylliosis and beryllium rickets from contact with the derivatives of beryllium. It has been shown recently, however, that beryllium so far from being poisonous is actually less poisonous than magnesium, and the results which have been attributed to beryllium in the literature have been due to its combination in such forms as the fluoride. The toxic properties which have been attributed to beryllium in reality are attributable to the fluoride portion of the molecule, or to local irritation on inhalation owing to the extensive hydrolysis of the beryllium salt particulate material, since beryllium salts are highly hydrolysed in solution. On the other hand *vanadium* has shown a strikingly poisonous action. . . . In spite of its pronounced toxicity, the number of cases of vanadium poisoning in industry has been small. . . . Most often fatalities from *cadmium* poi-

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soning have resulted from inhalation of the fumes of cadmium oxide, rather than the ingestion of cadmium salts. The first symptoms of industrial cadmium poisoning are usually dryness of the throat, cough, headache, vomiting and a sense of constriction of the chest. The latter symptoms are referable principally to the respiratory system and are characterized by cough, pain in the chest, severe dysphoria and prostration. These symptoms result from a pneumonitis which in many instances is followed by bronchopneumonia. Unfortunately, cadimum oxide fumes have no pronounced odor nor immediate irritant effect and can be breathed in fatal concentration without enough discomfort to drive the worker away from the exposure. In view of the extent and severity of cadmium poisoning in industry, a concerted educational effort has been proposed to apprise both manufacturers and users of the hazards involved in the use of cadmium coated products, and safety regulations have been proposed defining the degree of maximal permissible exposure of industrial workers. . . . *Molybdenum* has recently been found in our laboratory to be somewhat toxic although not comparable to vanadium in this respect. . . . *Tungsten* is admittedly somewhat toxic but the extent to which exposure can safely occur has heretofore received no particular amount of attention.

—From "Observations on Certain Inorganic Industrial Hazards," by LAWRENCE T. FAIRHALL, Ph.D., in *Connecticut State Med. J.*, 9: 2, 88, February, 1945.

CURRENT ARTICLES of QUALITY

Reporting Poison Cases

ALICE HAMILTON, M.D., Professor Emeritus of Industrial Medicine, Harvard University Medical School, "Diagnosis of Industrial Poisoning," given before the Third General Meeting at the Seventy-third Annual Session of the California Medical Association, Los Angeles, May 7-8, 1944, published in *California & Western Medicine*, 62:3, 110-112, March, 1945. Extract: "In closing I wish to emphasize the importance of reporting all cases of industrial poisoning. I know there is a tendency to report only those cases that are unusually interesting, but it is only by having all the manifestations revealed that we shall ever get a true picture of a poison. Why is it we say such and such a poison never causes such and such a condition? It is because so far it has not been reported and it may not have been recorded because the man who saw that unusual case is very busy and he has not written it up. Some of you see many cases of occupational disease and it is really your duty to give those cases publicity, especially if there is anything unusual about them. If you think an industrial poison had anything to do with a certain case of illness, put it on record, because your contribution will help to make up the general picture which at present is certainly incomplete, even with regard to the most familiar of the poisons."

Nutrition for Workers

MAY R. MAYERS, M.D., Division of Industrial Hygiene, New York State Department of Labor, review of pamphlet prepared by PROF. KATHERINE W. HARRIS, College of Home Economics, Cornell University, in *Industrial Bulletin and Employment Review*, 24:1-2, 58-60, January-February, 1945. Extract: "A Study prepared by MISS KATHERINE W. HARRIS, head of the College of Home Economics, Cornell University, discusses the practical problems of the various types of eating facilities for plants of various sizes — cafeterias, lunch counters, snack bars, rolling carts, etc. MISS HARRIS also presents typical floor plans for small, medium and large kitchens; arrangements for food preparation, dishwashing and food service, the choice of equipment, and a list of kitchen equipment to serve 100 workers. Because of the very practical suggestions which this pamphlet contains, and the increasing interest on the part of war plants in getting this type of assistance and guidance, a few of its more important contributions are briefly reviewed here. Persons interested in the pamphlet as a whole can get it, without charge, by writing the Emergency Food Commission, College of Home Economics, Cornell University, Ithaca, New York. While large plants

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REFERENCES: 1. West. J. Surg. & Gyn., 51:150, April, 1943. 2. Clin. Med. & Surg., 46:327, August, 1939. 3. Am. J. Obst. & Gynec., 46:259, 1943.

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tend to provide some sort of cafeteria service to their employees, this is not practicable for the smaller plant. Moreover, even in large plants having excellent cafeterias — many of which are subsidized—experience has indicated that a large percentage of the workers prefer to bring their lunch from home and not patronize the cafeteria. There are many reasons for this. Some prefer the lunch box because it is less expensive and more to their liking as to food selection. The time lost in reaching the cafeteria, especially in large plants, and waiting in line to be served is another objectionable feature. Other workers do not enjoy sitting down to lunch in soiled workclothes in a dining room also patronized by office workers. The lunch box is, therefore, the backbone of most workers' lunches whether they work in large or small plants. To provide some type of food to supplement their lunch box is thus a primary need. The supplementary foods should in general provide those nutrients which tend to be lacking in the average worker's lunch box, thereby ensuring better nutrition for him. This objective may be obtained in two ways: (1) by means of one or more lunch counters of limited size and equipment, strategically located in the plant, so as to be readily accessible to workers during their limited lunch periods; and (2) by movable carts which can be rolled to the worker's bench. The latter is especially useful for between meal rest-snack periods. Brief rest periods of this type, incidentally, have been found to be invaluable as a means of combatting fatigue and thereby increasing productivity. A small lunch counter, or a snack bar, can be organized as efficiently as a complete canteen if attention is given to proper grouping of working units in relation to one another, routing supplies and food personnel so as to save steps and avoid crossing the lines of traffic. Typical floor plans illustrated in diagrams indicate the application of these principles to small lunch counters and snack bars. Where plant facilities are limited, refrigerated dispensers or ice cream cabinets may be used to keep milk, tomato and fruit juices cold. Small platform trucks may be loaded with cases of milk and large thermos containers of hot soup and beverage. Milk and ice cream cans, in padded jackets or insulated wooden boxes, could take the place of the more expensive thermos equipment. With these, the hot foods may be packed in cartons and stored in compartments heated with soap stones, or they may be served directly from insulated containers. Much food can be carried on small well-designed mobile carts. Plants considering the installation of eating facilities—large or small—will find considerable additional information in PROF. HARRIS' leaflet."

Cardiacs in Industry

COMMISSION on Industrial Health and Hygiene of the Medical Society of the State of Pennsylvania, in *Pennsylvania Medical Journal*, 48: 7, 701, April, 1945. Text: "The present manpower shortage has caused industry to consider hiring employees who were formerly barred from gainful employment. Among this group are the so-called 'cardiacs.' Whether these people are hired depends largely upon the determination of the industrial physician and the policy of the industrial plant. It has been stated that approximately 25% of all jobs can be filled by persons with heart disease. The cardiac diagnosis should be in accordance with the nomenclature of the American Heart Association which considers etiology, structural change, pathologic physiology, and functional capacity. In doing this, a history including the past medical history with reference to cardiac etiology should be taken. Next, a complete physical examination, including the lung fields, size of liver, and evidence of edema is necessary. Auscultation of the heart after exercise and the response to exercise are significant in evaluating these cases. Likewise, tachycardia and elevated blood pressure often return to normal after a short rest period. Where possible, a routine six-foot chest plate or fluoroscopic examination for heart size and shape should be included. In the older age group, where arteriosclerosis is present, the electrocardiogram becomes of value but is of little help in the usual employable age group. There are no hard and fast rules that can be set down for the employability of a cardiac. Most congenital heart cases that survive to working age and show no evidence of congestion have only minor defects and can be depended upon for many years of useful work. Likewise, the well-compensated rheumatic case with mitral insufficiency alone or with stenosis is capable of many kinds

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*Shaffer, B.: Connecticut M. J. **7**:237-243 (1943)

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of light work. If the aortic valve is also involved the prognosis is less favorable. In the younger age group many functional murmurs may be found, and if the applicant is labeled as having cardiac disease, it may not only keep him from gainful employment but he may develop a severe cardiac neurosis. A person with untreated syphilitic heart disease plus aortic insufficiency or aortitis does not seem to be a good risk for employment, but this group of cardiacs falls into the upper age bracket of applicants and should be carefully picked out. Here a Wassermann test is indicated, if not routine, for all employees. In the older age group many persons with coronary artery disease are capable of fulfilling very useful positions and, with proper supervision, are able to carry on for a goodly number of years. Hypertension, if not of the malignant type, should not in itself be a cause for rejection since many patients have been known to be engaged in active work for years before ensuing heart failure and associated phenomena appeared. Thyrotoxic heart disease need not be considered here since it is a reversible process under proper management. Regardless of the type of heart disease, these employees should have routine heart check-ups about every three to six months to try to forestall any further damage. A change to a lighter type of work is advisable if such damage is detected. All cardiac employees should be placed in work that will require as little expenditure of effort as possible, for example, sedentary occupations such as office work, stationary machine work, packing, etc. They should not be placed at moving machines or at more than light labor. There is a definite place in industry for the cardiac if proper consideration is given his examination, placement, and routine check-ups."

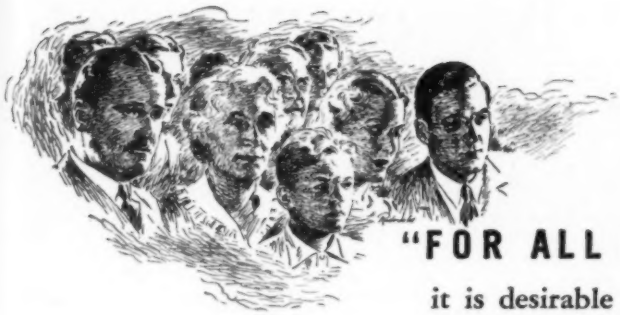
Low Back Pain

TREATMENT of low back pain with sciatica comprises correction of postural defects, strengthening exercises, adequate back strapping, and often the use of sacroiliac belts or back supports, according to a Providence, Rhode Island, orthopedist. Low back pain with radiating leg pains is treated according to the severity and the probable underlying cause. After elimination of infection, most patients are relieved by the above procedures. Occasionally perineural injection with novocaine at the great sciatic foramen may be necessary. Recurrent leg pain suggests the rupture of an intervertebral disk, but all other possible conditions must be considered and eliminated before operation is done.

—*Modern Medicine Topics*, May, 1945.

Medical Service in Industry

EDITORIAL, in *New England Journal of Medicine*, 232:14, 412, April 5, 1945: "Every vocational association strives to prevent the following of its trade or profession by unauthorized persons. This was begun by the medieval guilds and has been continued and amplified throughout the subsequent history of mankind. The primary purpose and the cause of its great success have always been the enhancement of the political power of its constituents while they in turn contribute their aggregate strength to the power of the central organization. There is, however, a less well-known but more important purpose—that of protecting the mass of the people against fraudulent and unscrupulous exploitation. Medical-practice laws are framed to support the latter purpose, and it is the solemn obligation of those who make and enforce them to provide the people with a high standard of medical care. It is likewise the obligation of those who are admitted to practice within the law to keep the practice of medicine on a high plane and available to all people at all times. What legally constitutes the practice of medicine may be a difficult matter to decide. In hospitals and institutions it is frequently necessary that the behavior of those who have to do with the sick and injured be codified into definite procedures. Such methods may be revised or amended from time to time to keep alive and maintain a complete understanding between all concerned. The ultimate responsibility for the choice and execution of the processes of medical care should be assumed by the doctor. In recognition of this responsibility the medical and nursing professions have long since adopted the principles of 'doctor's orders'; doctors expect to issue them and to have them carried out, and



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*Reznikoff, P. and Goebel, W. F.: J. Clin. Investigation 16:547, 1937.

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nurses universally expect to receive them and to carry them out. They have worked well in hospital and private practice because in these surroundings the doctor is expected to assume command; indeed, hospital trustees generally require him to write his orders where all may see and where there will never be any question about them. In the development of moden concepts of industrial health, however, there have appeared new relations. Management as a whole cannot be expected to have the same interest or insight into medical care in industry that hospital administrators have in the medical care in their institutions. Industrialists naturally and properly utilize nurses and 'first-aiders' to administer immediate aid and to carry out minor treatments. It has sometimes been thought that these nurses and first-aiders were not medically supervised. When, for example, does the giving of an aspirin tablet for a headache constitute medical practice, and when is it a minor commercial or friendly transaction? If the headache is due to meningitis, it is certainly medical practice to treat it in any way—from a first-aid medical cabinet, across a counter or in a hospital; but physicians cannot be expected to examine every case of headache on the remote chance that it may be a symptom of serious disease. Neither can they be expected to ignore everything of a minor nature. There are certain occupations in which headache may be a helpful sign of toxicity and may call for timely and expert medical attention. All these perplexing and complex relations indicate the need for further clarification of the doctor's role in industry. The Council on Industrial Health of the American Medical Association has advocated standing orders for nurses in industry, and standing orders for industrial first-aiders have been privately issued and used. In its statement elsewhere in this issue of the *Journal*, the Committee on Industrial Health of the Massachusetts Medical Society expresses its approval of standing orders for industrial first-aiders, thus indicating its belief that the supervision of first-aid practices in industry is an obligation of the medical profession. It can be claimed that this is a device under which industrial first-aiders will 'practice medicine without a license,' and it probably would not be difficult to find cases in which such actually was the case. On the other hand, the practical view, and the one that the committee adopts, is that the first-aider will be less likely to practice medicine if he is forced to work under medical supervision expressed by written standing orders than if he is permitted to proceed independently. This may be a significant step in the protocol of industrial health". . . . COMMITTEE on Industrial Health, Massachusetts Medical Society, DWIGHT O'HARA, M.D., Chairman — "A STATEMENT CONCERNING INDUSTRIAL HYGIENE IN THE SMALL PLANTS OF MASSACHUSETTS: In two previous reports to the Council of the Massachusetts Medical Society,[1,2] the Committee on Industrial Health has called attention to the fact that three quarters of the workers in Massachusetts are employed in the so-called 'small plants' of the Commonwealth, factories where there is still little or no medical supervision of industrial hygiene. The committee has continued to discuss this fact and now ventures to issue a statement about it. Many of these plants are not so small,—some of them employed 400 or 500 people, which is really a big industry,—but from the point of view of their health standards they are more comparable to the many little industries than they are to those large corporations that have found it feasible and profitable to maintain and staff their own medical departments. In the following discussion the term 'small' is therefore used in the sense that it indicates small interest or activity in the field of industrial health. It is easy to understand why these plants frequently lack this interest. Even though they aggregate a major industrial hazard to the people of Massachusetts, the management of each individual plant can actually concern itself with but a fraction of the total risk. It can insure itself against this fraction and let the matter rest right there. Of course, the chances are that this policy will keep it out of serious trouble, and management naturally is tempted to adopt it and turn its attention to other more pressing matters. Al-

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though this is probably the attitude toward industrial health among many of the small industries, there are today an increasing number of them in which a lively interest in the subject is being shown. When the latter are looked at more closely, it is usually found that an enlightened manager has whipped a doctor into line or an enthusiastic doctor has applied the 'bee' to management, or a restless nurse has refused to sink back into the routine of first-aid technics; and so progress has been made. The development of part-time nursing services for industry by district nursing associations was commented on in the report of a year ago[2] and has been described elsewhere.[3] There are many plants in which no nursing service is used, but in which some sort of first-aid equipment has been installed. This is usually presided over by a certified 'first-aider' or by someone in the plant who has come to take such responsibilities in the natural course of events. The committee desires to emphasize one point regarding all such persons, from the full-time nurse down to the casual first-aiders, namely, *they need medical supervision.* The complaint that is sometimes heard, or the fear that is sometimes expressed, that some of these people may be 'practicing medicine' can mean only one thing—they are not properly supervised by the medical profession. Such lack of supervision is generally due to one of the three kinds of unwillingness: unwillingness on the part of management to employ a plant doctor; unwillingness on the part of the doctor to issue standing orders or to give any advance thought to the health hazards of the particular industry; or unwillingness on the part of first-aid or nursing personnel to refer cases to, or at least to secure advice from, the doctor. A lack of interest and of a sense of responsibility emanating from any one of these three points of view will be an effective barrier to improvement. Positive interest and enthusiasm from all three, on the other hand, will surely raise the standard of industrial health wherever it is applied. A positive willingness on the part of management to employ a plant doctor must extend beyond the traditional readiness to consult the doctor after something has happened, which is mere medical care. Unless those concerned can look farther ahead and establish standards of prevention and health, they are going to let many things reach the stage of requiring medical care that might well have been stopped in advance. Management should anticipate such things by analyzing its own risks, by utilizing engineering and medical knowledge to eliminate them or to place safeguards about them and by adopting a first-aid policy suitable to the needs of its particular plant. No first-aid policy is adequate if it has not had, in advance, complete medical approval. Management should expect to secure this and to pay for it, and the doctor should expect to provide it and to be paid for it. A positive willingness on the part of the doctor to be called for purposes of inspection and observation of the conditions under which future patients may be injured, poisoned or exposed is most necessary. Too often—and especially now when all are overworked—the doctor does not believe that he needs to interest himself or to share in the development of such plant policies. He has many other responsibilities, and he naturally allows himself to be distracted by what, at any given moment, most urgently calls for his attention, but the standards of industrial health in the plant that employs him will never be high until he interests himself and assumes his share of the responsibility for the prevention of industrial disease. The third type of unwillingness, that of the first-aid or nursing personnel to accept supervision of all their activities, is encountered only under special circumstances. Nurses are trained to work under medical supervision at all times, and first-aiders can be made to follow orders readily if the doctor insists on it. In some cases he has to insist on it, for the overconfident type of personality frequently and naturally establishes itself in first-aid positions, and may seek to exploit itself on that basis. It is, however, difficult to understand how any first-aider can overstep his assigned duties if he follows written standing orders from the doctor. On the other hand, when the doctor's interest is not sufficiently forceful, there may develop circumstances under which it may be legitimately charged that someone is practicing medicine without a license. Chapter 149 of the

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This picture shows a terminal stage of rheumatoid arthritis. It illustrates, in addition to usual features of discoloration of the skin and wasting of the soft tissues, the presence of a cyst-like but actually a subcutaneous nodule on the second proximal interphalangeal joint of the index finger. Such nodules of a tubercle type occur, according to authorities, in about 10 per cent of patients with this disease. The fingers show atrophic changes involving particularly the third or middle digit. General involvement: including an ankylosing spondylitis or poker spine and locked jaws. This patient is also bedridden. X-ray shows marked subluxation in the metacarpal phalangeal articulations. There is irregularity of the articular aspects of the proximal interphalangeal joints and pronounced decrease of the distal interphalangeal joints. There is also loss of joint space of the carpal bones and resultant ankylosis. Note the generalized decalcification.

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General Laws of the Commonwealth of Massachusetts (Ter. Ed.), Section 141, states: 'Every person operating a factory, shop or mechanical establishment where machinery is used for any manufacturing or other purpose except for elevators, or for heating or hoisting apparatus, shall keep and maintain, free of expense to the employees, such medical or surgical chest, or both, as shall be required by the department, containing plasters, bandages, absorbent cotton, gauze, and all other necessary medicines, instruments and appliances for the treatment of persons injured or taken ill upon the premises. Every person carrying on a mercantile establishment where 20 or more women or children are employed, shall in the manner aforesaid provide such medical and surgical chest as the department may require.' Under the provisions of this chapter the Department of Labor and Industries requires that a specific list of articles be kept and maintained in a clean and dustproof receptacle. Concerning the use of any of these articles the department provides the simple admonition, 'WASH HANDS BEFORE USING.' Surely the doctor can improve not only on this standing order but on the inventory of the first-aid kit required by the Department of Labor and Industries.[4]. Standing orders for nurses in industry have been endorsed by the Council on Industrial Health of the American Medical Association,[5] and at least one insurance company has compiled standing orders for industrial first-aiders.[6] The committee expresses its approval of such contacts between the practicing doctor and the industrial nurses and first-aiders. The nature and extent of the contact cannot be sharply delineated, for even in one industry, plants vary, managements vary, nurses vary, first-aiders vary and, above all, doctors vary in their concepts of what medical supervision is to consist. The written standing order, however, constitutes an authoritative level at which responsibility may rest. Although standing orders can often be only a general statement of principles, they are always subject to amendment, modification or alteration by the doctor in charge, and may conveniently provide him with an instrument wherewith he can assert his authority in an impersonal way. The purpose of this statement is to indicate that progress in industrial health may be expected in the small plants of Massachusetts by cooperative efforts on the part of managers, doctors, nurses and first-aiders. The absence of such cooperative effort, on the other hand, will effectually block any substantial improvement of the working conditions and environments. This statement is submitted for publication in the *Journal* in the hope that doctors who read it may better visualize their personal opportunities and responsibility in raising the standard of industrial health in the small plants of the Commonwealth."

1. Reports of standing committee. *New Eng. J. Med.*, 227:745, 1942.
2. Report of Committee on Industrial Health. *New Eng. J. Med.*, 231:151, 1944.
3. WHEELER, R. S.: Waltham's employee health plan for smaller industries. *Industry*, 9:37-39, 1944.
4. Notice Form 10M-12-41-8080. Department of Labor and Industries, 473 State House, Boston.
5. Council on Industrial Health. Standing order for nurses in industry. *J.A.M.A.*, 122: 1247-1249, 1943.
6. MCCOY, D. A., and ZULON, S. S.: Suggested standing orders and procedures for industrial first aiders. INDUSTRIAL MEDICINE, 13:689-692, 1944.

Cancer

CANCER: Notes of Hope—Diagnosis and Prognosis of a Paradoxical Problem of Life and Death," in *Fortune*, April, 1945. Extract: "Much research effort is now being directed at isolating, classifying, and synthetically producing possible cancerigens, the scientists working backward in the hope that learning how to cause cancer may teach them how to prevent it. After years of work in many laboratories they have identified 284 cancerigens. The line of study goes back to 1775, when London's great surgeon Percival Pott attributed the tendency of chimney sweeps to get cancer in the skin of the scrotum to 'a lodgment of soot' rubbed in year after year. Among other substances with components related to 'occupational' cancers are certain tars, organic dyes and oils, and arsenic. The cancer of Kashmir shepherds has been traced to the burning charcoal with which they warm themselves, holding the pot between the thighs and the abdomen. Lip and throat cancers occur among smokers of hot, short-stemmed clay pipes and mouth cancer among chewers of Oriental betel-nut mixture with its high lime content. Skin cancer (for example, Texas skin and the afflictions of old admirals) occurs frequently after long exposure to powerful sunlight and wind. The northern white man living long in the tropics really has a burden; in those regions his skin tends to develop

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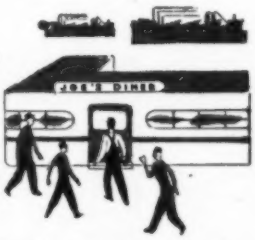
Entire communities have sprung up around new plants erected upon once barren acres. Established industries have expanded to many times their pre-war sizes. The volume of incoming workers has made itself felt in crowded living conditions, overtaxed transportation and sanitation facilities. This quick and great expansion has far outstripped shopping and recreation resources. Long hours, changing shifts, adjustment to new jobs have added further to the workers' problems.

NUTRITION PROBLEM



But behind these obvious effects of this large-scale shift in manpower, farther-reaching repercussions have made themselves felt. Out of this unprecedented dislocation of population has sprung the dismaying reality of inadequate diet.

While industry has striven mightily to provide adequate eating facilities, the sheer volume of workers plus lack of space as well as rationing has kept the problem a sore one. Thus profit the eating places fringing the plants—the diners, the "greasy spoons," the lunch carts, few of which provide nutritious quality foods at low prices.

NATIONAL DEFICIENCIES

So is added another facet to the fact already established by the statement of the National Research Council: "All the data from numerous surveys, with new methods, among persons of all ages, in many regions, are entirely in accord in showing that deficiency states are rife throughout the nation."

Is there not ample reason, then, to assume that such a situation prevails among your employees?

The importance of recognizing this situation is obvious when it is realized that excessive fatigue, lowered resistance to colds, eye-strain, impaired efficiency and lowered morale may be caused by faulty diets . . . especially diets deficient in vitamins and minerals.

VIMMS INDUSTRIAL PLAN

VIMMS WIDELY USED

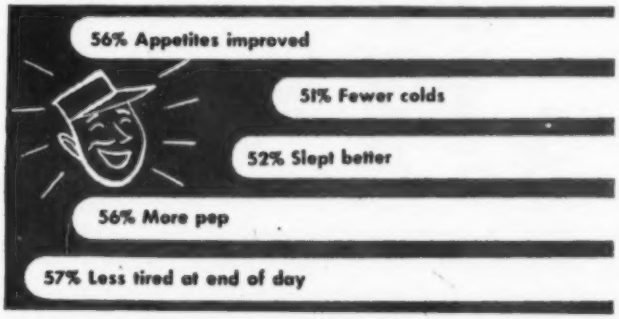
Many industries—textile, chemical, machine-tool and numerous others—are using the Vimms Industrial Plan in plant and office to help protect workers against the efficiency-impairing results of deficient diets.

Inexpensive and easily organized, the Vimms program supplies all the vitamins known to be essential in the diet, plus all the minerals commonly lacking. Vimms actually make up the difference between what the average worker gets in his regular diet (U. S. D. A. circular 507) and what he should get (NRC Recommended Allowances for vitamins and minerals).

Plants using the Vimms Plan report up to 90% of the workers participating in this vitamin-mineral supplementation program.

TYPICAL EMPLOYEE REACTIONS

In a large manufacturing firm, employees taking Vimms regularly, returned questionnaires reporting:



Equally gratifying are results reported by other companies.

TAILORED TO YOUR OPERATIONS

The Vimms Industrial Plan is carefully worked out by our trained industrial consultants, custom-tailored to your own individual system of operations. Distribution trays, speakers for employees' meetings, posters and payroll stuffers are all part of the service and material provided free with the plan.

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Gentlemen: Your story sounds interesting. I'd like to know more about the Vimms Industrial Plan.

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The External Cod-Liver Oil Therapy

USED EFFECTIVELY IN THE TREATMENT OF

Wounds, Burns, Ulcers, especially of the Leg, Intertrigo, Eczema, Tropical Ulcer, also in the Care of Infants

Desitin Ointment contains Cod-Liver Oil, Zinc Oxide, Petrolatum, Lanum and Talcum. The Cod-Liver Oil, subjected to a special treatment which produces *stabilization* of the Vitamins A and D and of the unsaturated fatty acids, forms the active constituent of the Desitin Preparations. The first among cod-liver oil products to possess unlimited keeping qualities, Desitin, in its various combinations, has rapidly gained prominence in all parts of the globe.

Desitin Ointment is absolutely non-irritant; it acts as an antiphlogistic, allays pain and itching; it stimulates granulation, favors epithelialisation and smooth cicatrisation. Under a Desitin dressing, necrotic tissue is quickly cast off; the dressing does not adhere to the wound and may therefore be changed without causing pain and without interfering with granulations already formed; it is not liquefied by the heat of the body nor in any way decomposed by wound secretions, urine, exudation or excrements.

DESITIN POWDER

Indications: Minor Burns, Exanthema, Dermatitis, Care of Infants, Care of the Feet, Massage and Sport purposes.

Desitin Powder is saturated with cod-liver oil and does not therefore deprive the skin of its natural fat as dusting powders commonly do. Desitin Powder contains Cod-Liver Oil, (with the maximum amounts of Vitamins and unsaturated fatty acids) Zinc Oxide and Talcum.

Professional literature and samples for Physicians' trial will be gladly sent upon request.

Sole Manufacturer and Distributor in U. S. A.

DESITIN CHEMICAL COMPANY

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cancer. And in the early twentieth century physicians exposed over long periods to heavy doses of the new x-ray developed cancers. In 1927 New Jersey factory girls who tipped between their lips brushes used to paint luminous watch dials swallowed enough mesothorium and radium so that small amounts lodged in their bones bombarded the marrow with alpha particles of radium to produce bone cancer. With cancerigenic agents, investigators have produced enormous numbers of cancers. Japanese scientists, probing the relation between rice diet and liver cancer (unusually common in Japan), gave a lead when they discovered that by feeding 'butter yellow' (a dye related to nothing in the whole range between oleomargarine and the best butter) they could cause liver cancer in rats. Study established a connection between the potency of butter yellow and the diet and vitamin pattern. If this is also true in humans, a pin point of light flashes over the scene: control the diet to prevent cancer. How, scientists cannot yet say. But they have identified one specific thing they want to know, and can use scientific methods to get at it. What is even more important about butter-yellow cancers is the light they shed on the specific way in which the cell mutation is stimulated. The dye poisons certain vital liver-cell processes. To survive, the poisoned cells develop a new vital process whereby they can successfully compete with and even destroy normal cells. Such tough cells are the cancer cells. It was another Japanese team that, following Dr. Pott's old leads, painted tar (closely related to soot) on rabbits' ears every three days for 10 months. Although spontaneous cancer is unknown on the ear, the skin of some ears developed cancers, which then metastasized. But which of tar's many ingredients was to blame? Researchers set out to isolate a pure cancerigen in the tar potpourri. The work was pioneered by England's E. L. Kennaway and J. W. Cook. Scientists have now identified a whole group of organic substances related to tar that are extremely potent cancerigens in rodents. And all share one molecular base, known as the phenanthrene ring system."

Solvents

MAY R. MAYERS, M.D., Division of Industrial Hygiene, New York State Department of Labor, "Industrial Solvents—Health Hazards and Prevention" published in *Industrial Bulletin and Employment Review*, 23:11-12, 346-348, November-December, 1944. Extract: "In plant medical surveys, what are the earliest blood changes to be looked for? Experience has shown that, by and large, too great reliance should not be placed upon a leukopenia alone when one is attempting to spot early cases of benzol poisoning in such a survey. Any white cell count below 5,000, should be looked upon as having possible significance and the patient kept under careful medical observation. Marked leukopenia is more frequently found in severe than in early cases, and may occasionally be absent even in the former. Reductions in the red cell and platelet counts when associated with an increase in mean corpuscular volume appear to be the earliest signs of intoxication. Indeed, a macrocytosis in a benzol worker should, per se, be looked upon with suspicion even in the absence of all other blood abnormalities. The absence of purpura and bleeding from mucous surfaces should not lull the physician into a false sense of security. Next to benzol, carbon tetrachloride is perhaps one of the greatest offenders of the industrial solvents. Its use during the war has increased enormously. This is partly due to the fact that its toxicity is not adequately appreciated; partly to the fact that it is sold under a great variety of trade names so that the user has no knowledge of its chemical composition; partly because it is peculiarly suitable, because it is non-inflammable, for use in cleaning large machinery, motors, dynamos and the like which cannot be dipped into the degreasing tanks used for small metal parts. There appears to be an enormous difference in individual susceptibility to this substance. Alcohol seems to greatly dispose to acute poisoning. To the medical practitioner, carbon tetrachloride poisoning presents some very difficult problems in differential diagnosis. Except in extremely acute cases, one is dealing with a toxic hepatitis; a nephrosis, or a combination of both. There is nothing in the clinical picture which is pathognomonic of carbon tetrachloride. The patient is usually jaundiced when he first consults his physician. Is it obstructive jaundice, catarrhal or epidermic jaundice; or is it a toxic hepatitis? Only a careful work-up of the

Seldom sick *but* never well

• Today, with our generously rationed American diet, there are few who develop frank vitamin deficiency syndromes.

But there is a great host of people who do not enjoy buoyant good health because they fail to obtain enough of these all-important accessory food substances.

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Each 'AVICAP' contains: Vitamin A . . . 5,000 U.S.P. units; Vitamin D...500 U.S.P. units; Vitamin B_1...1 mgm.; Vitamin B_2...2 mgm.; Vitamin C . . . 30 mgm.; Nicotinamide . . . 10 mgm.

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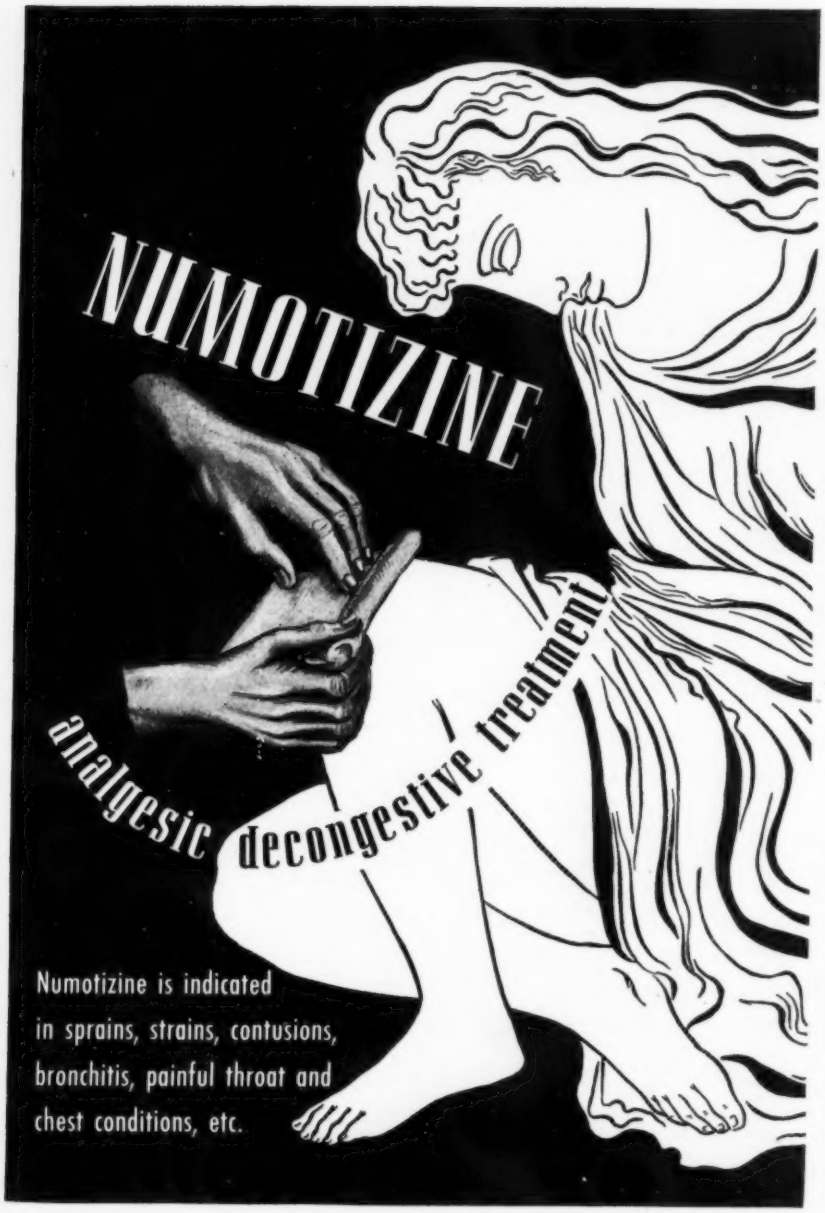

NUMOTIZINE, INC., 900 North Franklin Street, Chicago 10, Illinois, U. S. A.

case will produce a correct diagnosis; and, in such a work-up, the occupational history in indispensable. That does not mean that a person who has been exposed to carbon tetrachloride may not also develop an obstruction of the biliary tract in no way related to his occupation. In a toxic hepatitis, however, one gets very suggestive changes in the blood chemistry: A phosphatase above 10; increase in serum cholesterol; a high serum bilirubin; low total proteins, with the serum albumin especially low, and the euglobulin somewhat elevated. The icteris index is elevated; one gets an indirect Van den Berg reaction and increased bilirubin in the urine. There may be an increase in blood guanidine to which some workers attribute the liver damage. The blood sugar and calcium are low. The blood nitrogen is high where there is an associated nephrosis, as there often is. To the physician who sees the case early in the plant medical office, the patient may present a very different picture. He may come in complaining of gastro-intestinal disturbances only. There will be no jaundice at this stage and many of these cases are consequently unrecognized as potential liver cases. The worker is frequently given a pill, by the physician or the nurse, and sent about his work. By the time jaundice develops, it may be impossible to save his life. This is not an uncommon experience. A plant physician should acquaint himself with the substances to which the workers, for whom he has assumed responsibility in the plant, are exposed. If they are working with a hepatotoxic substance such as carbon tetrachloride, he must regard any case coming in with gastro-intestinal complaints as a potential liver death and investigate the case thoroughly and without loss of time. He should see exactly where in the plant the person has been working, and assure himself that the operation is conducted with proper safeguards so that he will not have a series of liver deaths on his hands in the immediate future. This has happened more than once in our experience."

Coronary Disease

DR. CHARLES C. WOLFERTH, Professor of Clinical Medicine, School of Medicine, University of Pennsylvania, "The Treatment of Coronary Disease," in the *Bulletin of the New York Academy of Medicine*, April, 1945. Extract: "PERIODIC OR HEALTH EXAMINATIONS. The rapidly increasing emphasis on preventive medicine and growing acceptance of periodic or health examinations by industrial organizations and by individuals present an ever greater problem to physicians concerned with the cardiovascular aspects of these examinations. Some papers advocating such examinations overestimate the ability of physicians to detect coronary disease in its early stages and to retard its further development. Too many who have been slapped heartily on the back and told they have no heart disease have died during the next few days or weeks, to the discredit of their optimistic examiners. The most one is justified in saying after a negative examination is that no evidence of heart disease has been found. On the other hand too many are told that they have heart disease on the basis of findings that do not actually establish the fact. In the past such a finding was often an innocent murmur; now it is apt to be some deviation from empirically derived electrocardiographic standards which do not deserve all the faith sometimes reposed in them. The greatest problem of all concerns the far from small percentage of individuals in older age ranges who present unmistakable evidence of myocardial involvement, in some the result of hypertension but in many others coronary disease without hypertension. Perhaps the greatest single mistake made in the management of these groups is to assume that prognostic data obtained from the study of patients who seek medical advice because of illness apply with equal force to those who are without symptoms. For example bundle branch block in hospital practice has in general an ominous prognosis although there are many exceptions to the rule. On the other hand bundle branch block found in examinations of the presumably healthy has a far more favorable outlook. These individuals as well as others found to have evidence of coronary disease should be instructed to avoid strenuous physical activity, to obtain adequate rest and sleep and avoid indiscretions of food intake and intemperance in other habits. Those whose duties entail severe physical or mental strain should be advised to try to obtain easier work. However, care should be exercised not to place un-

The burn case illustrated was caused by an explosion of hot liquid cyanide. In addition to the hand, the forehead, neck, arm and side were affected to the extent of first, second and third degree burns.

The three problems confronting the physician on this case were effectively handled by Morco with Sulfathiazole. First, the problem of infection. The presence of sulfathiazole 5% in Morco with Sulfathiazole, eliminated infection throughout the successive stages of the treatment. Second, the problem of pain. Benzocaine, included in Morco with Sulfathiazole, acted immediately as a local analgesic. It is interesting to note that the patient, although unable to use his arm and hand, continued his duties as departmental foreman throughout the treatment. Third, the problem of accelerating the growth of firm, elastic skin without scar tissue. The high concentration of vitamins A and D in Morco with Sulfathiazole, stimulated epithelization and granulation. Cod liver oil therapy results in a pliable, elastic membrane and reduces contractures and scarring. The aromatic base in this preparation effectively neutralizes the pungent odors present in second and third degree burn cases.

In this, and every other case where it is used, Morco with Sulfathiazole has proved to be a superior preparation for the treatment of burns and superficial wounds.

Morco with Sulfathiazole contains 65% medicinal cod liver oil U. S. P., sulfathiazole 5%, benzocaine 1%, wool fat, phenol, boric acid, zinc oxide and aromatics

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Early discovery, and immediate and effective control, are important in the treatment of Pediculosis among war production workers. Unless proper steps are taken, a single case of Pediculosis may lead to infestation of other employees.

Cuprex is a valuable aid to the industrial physician who bears the responsibility of having to discover and check any condition which may impair the efficiency of the workers under his care.

Cuprex therapy is simple. One treatment—of from 15 to 30 minutes—destroys the nits as well as the lice. Cuprex requires no messy or repeated applications, and the patient may return to his job without delay, and without embarrassment.

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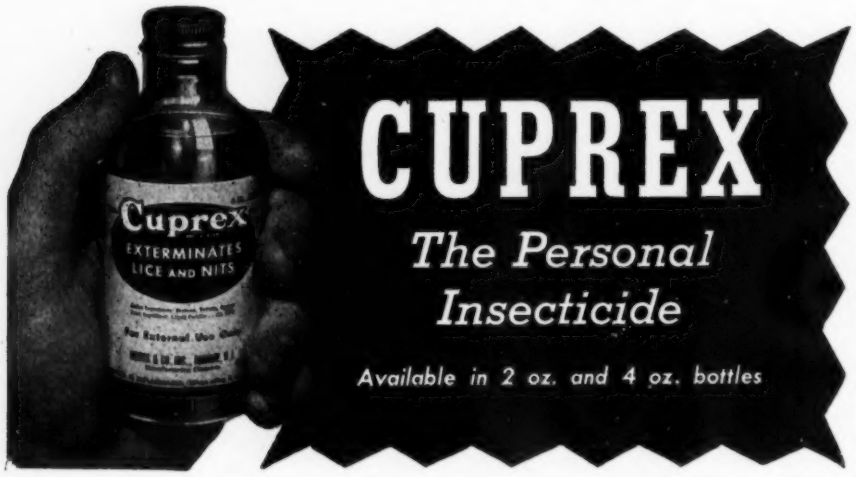

necessary restrictions on the lives of these men, and above all not to stop them from useful work if they are able to carry on, and wish to do so. Otherwise one may engender a sense of defeat, mental depression or anxiety. Individuals unnecessarily restricted like those who receive a mistaken diagnosis of heart disease would have been far better off without health examinations."

The Patient Who is Always Tired

WALTER C. ALVAREZ, M.D., Rochester, Minnesota, "What's the Matter with the Patient Who is Always Tired?" — *Connecticut State Medical Journal*, 9:4, 280-284, April, 1945. Extract: "Hypertension usually begins in youth and often makes the victim a bit tired and worried about his health. Hyperthyroidism, hypothyroidism and heart disease are less common causes for a fatigue state. Often an attack of influenza will leave the patient tired for weeks or months, especially, perhaps, if there has been an encephalitic type of virus mixed up with it. A tendency to migraine will often-times go with a fatigue state. In my opinion brucellosis is now a poor diagnosis to make. I see many persons with this diagnosis but I can rarely confirm it. Almost every patient who has come to me with this diagnosis has looked to me more like an ordinary 'neuro' with occasionally an afternoon temperature of 99.5° F. I think this temperature is normal for most nervous women. In case of suspected brucellosis I look at the spleen with the roentgen ray, and, when I find it small, I seriously doubt the diagnosis. I also get a blood sedimentation rate and when it is under 10 mm. in an hour I cannot believe that the patient has any smouldering infection."

'Share-the-Doctor' Plan

A. D. STEFFERUD, "'Share-the-Doctor' Plan Tested by Small Industrial Plants," in *Medical Economics*, April, 1945: Text: "In more than one American industrial plant of limited size a new pattern of medical service is being worked out which may have large implications for the postwar years. Such plants — none large enough to maintain a full-scale medical department—are sharing physicians' services part-time, and achieving an efficiency that promises to put their standard of care on a par with that of many a large company with a full-time staff of one or more physicians. Exemplars of this new share-the-doctor plan are three factories in New Haven, Connecticut, and four in Long Island, New York. The New Haven Industrial Medical Service, a project of the Chamber of Commerce, is three years old. The Long Island City project started functioning the first of this year. And while it is conceded that the plans are not fully seasoned, the fact remains that they have cracked the shells of two tough nuts: (1) provision of efficient industrial care for American workers, most of whom work in small plants; and (2) establishment of an attractive working basis for physicians who are turning to industrial practice. First, the Long Island City program: The Astoria section, just across the East River from Manhattan, has a population of approximately 250,000; its industrial population of 75,000 work in 1,000 plants, the largest of which has 8,000 employees. Products include chemicals, automobile parts, machine parts, ordnance material, and electrical and radio goods. One plant participating in the cooperative arrangement employs 700; the three others have fewer than 500 workers each. They are served by three general practitioners, who devote from six to twenty hours a week to the work. Each man lives only a few blocks from the plant he serves. A usual fee is $10 an hour, and the physicians earn every cent of it. Their work includes replacement examinations of workers; advice on their physical capacity for jobs; periodic check-ups; control of hazards; health lectures; first-aid instruction; supervision of sanitation; emergency treatment for accident and acute illness in the plant; and supervision of special placements (e.g., returning soldiers). Astoria project physicians say they like the work, remuneration, and results. One of them, DR. MAXWELL H. KAIDEN, has summed it up thus: 'This project, though new, is not to be looked upon

"Today I was thinking of the debt we owe to the people and products whose character remains unchanged during these days of stress. The simple fact that there *are* things on which we can still rely helps us, I am sure, to maintain our own integrity and the degree of tranquility necessary to our own best work. And there still are many things we can trust. Products like A. S. R. Surgeon's Blades, for example . . . always the right 'feel', the correct degree of keenness, and the right balance."

The unchanging quality of A. S. R. Surgeon's Blades has won an enviable reputation with the profession. *Always* the correct balance, the right "feel" and keen to the correct degree, these blades qualify richly as "things we can trust these trying times."

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as an experiment in medical care. Medical departments have been in existence in many large industrial plants all over the country. The outbreak of the war, which made necessary conservation of manpower, has been a great stimulus in spreading this idea. However, the smaller industrial plants have, undoubtedly because of the expense involved and lack of know-how, lagged behind. In one month of smooth operation between employee, foreman, personnel department, and medical department can be be considered a criterion, it is proving successful indeed.' The workers at DR. KAIDEN'S plant have reciprocated by telling their union: 'It's a great feeling to know you're in good health—not only feeling O.K., but knowing you're O.K. too.' Among the organizations that cooperated in getting the service going are the U. S. Public Health Service, which provided two officials as directors; labor unions; the New York City Department of Health, which will pay for nursing service for the first year; the New York State Department of Labor, division of industrial health, which gave much of the original impetus and advice to set up the plan; and the Queens County Medical Society, through which the plants obtained physicians. The medical departments comprise two to five rooms, One plant, going whole hog, spent $3,000 on equipment; the others appropriated $500 or less. Sponsors of the Astoria project recommended space approximating one square foot per employee to be divided into rooms for consultation, examination, and treatment; plain but serviceable facilities, including sink, telephone, and toilet; adequate light, heat, ventilation, cleanliness, and privacy; and the basic armamentarium of a general practitioner. No estimate can yet be given of operating expenses at Astoria, since the project is new and the cost of nurses, records, supervision, etc., have not yet been charged directly to each health unit. But the figure may be $7.50 per worker per year. (In older, larger plants, the cost ranges from $2.50 to $30 a year per worker, depending on extent of the service, the number of workers, equipment, hazards, method of auditing costs, etc.) Older is the New Haven Industrial Medical Service founded in 1942 with the cooperation of the New Haven Medical Association, the New Haven Visiting Nurses' Association, and a division of the Yale University of Medicine. One part-time physician serves three member plants. Outside physicians give pre-placement examinations. The Service is maintained at a cost of $6.40 per worker per year. Backers of the plan believe the physicians' time could best be used in five or six plants (rather than three), located fairly near each other and employing about 1,000 workers altogether. The yearly cost per worker would then approximate $6. The part-time doctor has plant headquarters in a small room (primarily a first-aid station) where injuries are treated. Some patients are referred to specialists, some (accident cases) to workmen's compensation physicians, and some to workers' family doctors. The plant physician makes recommendations regarding the installation of new machinery, safety devices, ventilators, etc. He visits each plant one to three times a week (a nurse spends one or two hours a day at each). In addition—being responsible for the program—he is available for consultation and inspection on call of the management."

Toxicity of Zinc

D. MARK HEGSTED, JOHN MCKIBBEN and CECIL K. DRINKER, Department of Nutrition and Physiology, Harvard School of Public Health, and Department of Biological Chemistry, Harvard Medical School, "The Biological, Hygienic Medical Properties of Zinc and Zinc Compounds," in *Supplement No. 179, Public Health Reports.* Extract: "No new facts have appeared relative to zinc chills or metal fume fever. These chills are an annoyance, readily prevented by adequate ventilation. It is estimated that chills will not occur if the air breathed does not contain more than 15 mg. of zinc per cubic meter of air. Greater interest has been current in the possibility that continuous ingestion of soluble zinc compounds swallowed with the saliva during the working day may cause chronic gastro-intestinal disease, and at present the indications are that in the presence of severe exposure workmen will not infrequently be found who develop a chronic gastritis with vomiting, which does not improve until the man is given work out of zinc in the air. There is no reliable evidence

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White's Otomide is a stable solution of urea (carbamide) and sulfanilamide in glycerin. The glycerin employed in this product has been especially processed to assure high specific gravity. Chlorobutanol, a recognized local anesthetic agent *that is therapeutically compatible with sulfonamides* is included in the formula for its analgesic and antipruritic properties.

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that absorbed zinc affects the digestion, as in the case with lead. The action seems to depend upon zinc taken steadily directly into the stomach. There is no good evidence of lung injury from zinc compounds. One expects skin irritation from contact with caustic compounds of zinc, such as the chloride and sulfate. To these relatively simple conditions, recent information has added a very troublesome dermatitis due to zinc chromate. It is certain that the chromate part of the molecule is the offender, but for practical purposes of control zinc is necessarily involved."

Impairment and the Job

VERNE K. HARVEY, M.D., Medical Director, U. S. Civil Service Commission, and E. PARKER LUONGO, M.D., Assistant Medical Director, U. S. Civil Service Commission, Washington, D. C., "A Comparative Study of Accident Experience, Production and Efficiency, Sick Absenteeism and Turnover among 2,858 Physically Impaired and 5,523 Able-bodied Workers in Government Industry," *Journal of the American Medical Association*, 127:14, 902-907, and 127:15, 961-970. Conclusions: "(1) A study has been made of the job performance of 2,858 physically impaired male and female workers as compared with that of 5,523 able-bodied male and female workers of similar age, experience and occupational characteristics from the standpoint of accident experience, production and employment stability. (2) The average accident frequency rate for the physically impaired was found to be higher than the average frequency rate for the able-bodied. An excessive number of accidents in certain physical defect classes contributed heavily to the accident frequency rate of the impaired group. The physically impaired experienced proportionately less severe accidents than the able-bodied. There is evidence that a psychologic element relating to some types of physical impairments plays an important role in causing significant variations of frequency rates among the several classes of physical defects found among impaired workers in certain types of industries without raising overall accident and severity rates or production costs of those industries. The psychologic element in accident proneness cannot be measured or altered either by ordinary interview or by matching physical capacities or other qualifications to physical and other demands of jobs. It can to some extent be detected before employment both in the able-bodied and in the physically impaired by means of tests which partially measure certain psychologic functions involved in industrial proficiency and accident proneness. (3) The productivity, both in quantity and in quality, and the efficiency ratings of the physically impaired were found to compare favorably with those of the able-bodied. (4) Findings on increased short term sick absenteeism among the physically impaired show some correlation with the accident experience of this group and suggest that those workers who most often report minor sickness may be less resistant to fatigue and more likely to incur accidents. (5) A much lower rate of turnover was found among the physically impaired than among the able-bodied, indicating that the impaired are superior from the standpoint of employment stability and that no large number of impaired workers during a twelve-month period were separated because of skill failure, physical demands failure or other causes. (6) The percentage of job changes, or tailoring, in the employment of impaired workers was relatively too low to be consistent with effecting optimum job performance of the impaired. This low percentage of job changes may be an expression of the urgency for getting persons on the job with a minimum of delay in order to meet production deadlines. (7) The percentage of the physically impaired receiving special considerations with regard to transportation, lunch and rest periods, hours of work and methods of remuneration, special equipment or in time reporting has been found to be low. (8) The impaired as well as the able-bodied show a substantial increase in earnings at the time of initial employment in their jobs."

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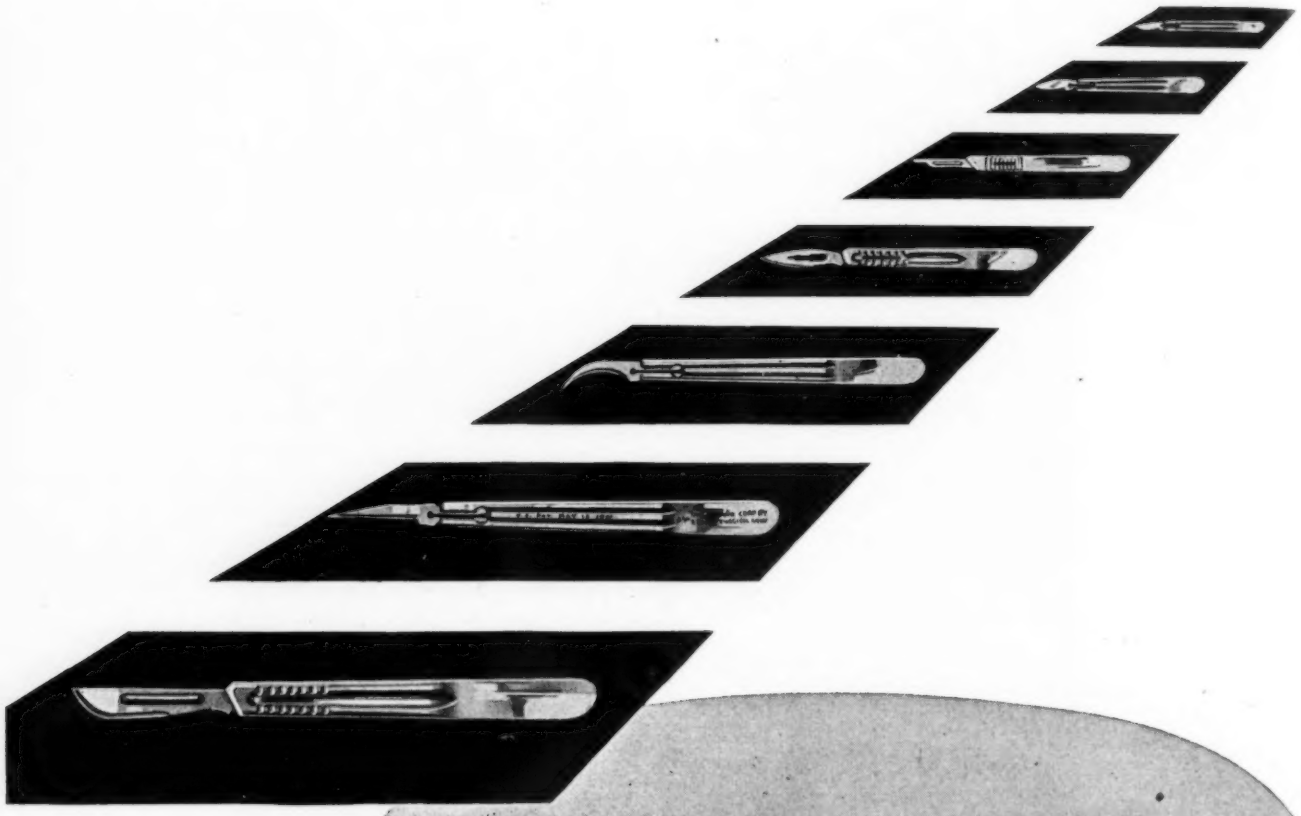

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The Science, the Law and the Economics of Industrial Health

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Industrial Medicine and Accident Prevention

—The Personal Factors of Accidents—

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THE PAST 20 years have witnessed the rapid development of two preventive services in industry: (1) industrial health, and (2) safety, or accident prevention. In some industries, emphasis has been placed on accident prevention, and relatively little attention has been given to industrial health; in others, emphasis has been on industrial health, with little development of adequate safety programs. Most of the larger industries, however, have effected a balance in preventive services and have fostered the concurrent development of industrial health and safety programs. In industries which have developed both services, there has not always been a clear-cut distinction between the responsibilities of the industrial physician and those of the safety officer or engineer.

It is patent that industrial health and safety are interrelated. Both pertain to the worker and his relationships to the working environment. Broadly speaking, the problem of accident prevention encompasses two considerations: (1) the individual, and (2) the environment. The industrial physician, in his role of plant health officer, is involved in both of these considerations. It is true that the industrial physician's responsibility is greater from the standpoint of the individual than from the standpoint of the environment. Great strides have already been made by safety engineers and safety officers in effecting mechanical safety through the use and development of safety devices and appliances for machinery; there is no intent here to detract from the excellent and valuable work done by safety engineers in improving working equipment. However, a comparatively small percentage of all accidents have been found to be due to mechanical causes (only 10 to 20%).[1] We have, therefore, a remainder of 80 to 90% which are due to personal factors. This places the problem definitely in the sphere of industrial medicine.

Except for the excellent work done by industrial physicians in the past six years in analyzing the physical requirements and the environmental factors of jobs, their participation in accident prevention from the standpoint of the individual has not measured up to the role safety engineers have played in accident prevention through improvement of machinery and safety devices. There is a fertile field, therefore, which industrial medicine can cultivate. In this field are the answers to the "why" of accidents from the standpoint of the individual and to a lesser extent from the standpoint of the environment. It is in this field that we can expect solutions for the majority of accidents, which hitherto have not been solved by standard safety programs found in industry.

Industrial physicians can and should fully participate in accident prevention in industry. They can do so with propriety, and without invading the sphere of responsibility of the safety officer or safety engineer. At no time, however, should there be a lack of coordination between these two preventive services in industry. The question, therefore, is, What can the industrial physician do in the field of accident prevention from the standpoint of the human and environmental factors involved?

Industrial Health Research Board, Great Britain

LET US look at what has been done in the field of accident prevention here and abroad. British investigators, with characteristic exactness in scientific research, have contributed the most notable groundwork in the field of accident prevention. Reports of the Industrial Health Research Board[2] (formerly the Industrial Fatigue Research Board of Great Britain) furnish a wealth of information on personal and environmental causes of accidents. This information is based on research by Newbold, Greenwood, Chambers, Farmer, Kirk, Osborne, and Vernon.

In looking back upon the early work of these investigators, one cannot but feel that they were voices crying in the wilderness. The practical application of their findings was deferred because false hope sprang up among industrialists that the improvement of machines and safety devices would be the answer to the problem of accident prevention. The utility of safety services in industry in accomplishing improvements in machinery and safety devices has been proved, but it has taken 20 years to bring about a full realization of the fact that the human factor is the essence of the problem of accident prevention.

The British investigators found a relationship, from

the standpoint of environment, between increase in accidents and extreme heat and cold. They found that accident reports were most favorable where workers performed their duties under moderate temperatures. It was demonstrated that accidents were more numerous among the young and inexperienced than among the old, but that accidents were more severe among the old. Unfavorable lighting conditions were found to increase the frequency of accidents. Some relationship between night work and accident rates was demonstrated.[3] From the standpoint of the worker, findings disclosed that conditions such as fatigue, speed of production, and employee health were causative factors in influencing accident rates. Vernon and Osborne demonstrated that atmospheric conditions appear to have an appreciable influence on accident rates. For instance, by installing thermographs in two large munitions factories during World War I, they showed that there is an optimum temperature of about 67.5° F at which accident incidence is at a minimum, and that accident incidence increases as the temperature rises above or falls below the optimum point. They found, through an analysis of more than 50,000 accidents, that there was a correlation between speed of production and variation in accident frequency. Psychical influence played a part in fatigue, especially in the difference between accident rates of night and day workers.[4]

The most important finding in the early work on this subject was that accidents do not happen by "accident." They are more likely to happen under certain conditions than others, and they are more likely to happen among certain individuals than others. All persons are not equal with respect to accident liability; under equal exposure to risks, some inherently are more likely to suffer casualties than others. It was found that in any industrial group there are some workers, although relatively few, who have a greater tendency to suffer accidents than their fellow workers. This tendency shows itself in different periods and in different kind of accidents, both at home and at work, and causes both minor and major accidents.

Chambers and Farmer compared the accident and sickness records of a group of apprentices who had failed in their trade tests with the records of a similar group who were successful in trade tests and found that the accident and sickness rates of the failures far exceeded those of the successes. The tests which Farmer and Chambers used demonstrated relationships between accident proneness and industrial proficiency in the skilled trades.[5] It was not their opinion, however, that a final stage had been reached in diagnosing accident proneness, nor even that the application of tests without regard to mental fitness, temperamental stability and fitness for the occupation would reduce accidents. In effect, they implied that the health examination at the time of employment should evaluate organic fitness, temperamental stability and motor coordination.

In view of the almost apathetic view which is taken toward the problem of accident proneness, it is somewhat refreshing to note that Farmer and Chambers, as far back as the late twenties and early thirties, ventured to discuss the treatment of the accident-prone person. They point out that those people who have higher accident rates from no apparent cause have a psychological pattern which cannot be measured or altered by ordinary interview, but can be measured to some extent by psychological testing. In commenting on the practical application of their findings, they indicated that it would naturally be preferable to avoid placing accident-prone persons in dangerous occupations, rather than to allow them to be placed and reject them after they had sustained an undue number of accidents.

More recently, Vernon has expressed doubt that purely psychological testing can identify accident-prone persons with certainty.[6] In effect, this has transferred the challenge for solution of the problem from the field of pure psychology to the field of medicine. The problem, therefore, is fundamentally one for medical science to solve. Medicine has met many such challenges in the past.

Accident Proneness Studies in the United States

MOST of the studies in this country on accident proneness relegated physical defects to a role of minor importance in the causation of accidents.[7] There is evidence that the low percentage of accidents attributable to physical defects may be due to weaknesses in the evaluation of the defects at the time of pre-employment examination, or in the investigation of pre-existing physical defects in the injured employee. Also, there is considerable evidence that there has been a lack of consideration given to the psychological aspects of disease and to the relationship between physical defects and fatigue.

It is realized that the mention of the words "psychological testing" brings to mind to the industrial physician the unhappy prospect of having to administer a psychological testing program calling for large batteries of tests, and also brings to mind the question of the propriety of such testing in an industrial health program. The truth of the matter is that the personality of the prospective employee in industry can be diagnosed at the time of the pre-placement examination in the same manner that heart disease, pulmonary disease, or other organic disturbances are diagnosed. Failure on the part of industrial medicine to pay as much attention to the psychological aspects of the examinee as to organic or physical aspects contributed greatly to the lack of progress made in the field of accident prevention from the standpoint of the human factors involved. Organic defects, rather than psychological traits, have received emphasis in hiring practices. Considering accident proneness purely from the standpoint of organic defects has led industrial physicians far into the realm of prophecy in pre-determining the effect of an organic defect on an individual's accident proneness on the job.

Diabetes not under proper control is a good example of a case in which a physical defect in itself becomes a factor in accident proneness. An individual may have poor vision due to diabetic retinitis; he may become tired, sleepy or even comatose, and under such conditions he may suffer injury. We do not mean to imply, therefore, that there are no organic defects which *per se* have a relationship to accident proneness. This relationship has been shown by Biram and Barton, who demonstrated correlation between suppression of simultaneous binocular vision, impaired stereopsis, exophoria and distant vision, and esophoria or near vision, with an increase in accident proneness of workers.[8] Kuhn's investigation of accident rate as it relates to visual skill also suggests a relationship between visual defects and causation of accidents.[9] It is not believed, however, that the findings of these investigators were totally devoid of psychological factors which influenced increases in accident rates.

Poole and Bent[10] recently demonstrated a higher frequency rate of accidents among cardiac terminees in the Lockheed Aircraft Plant than among other plant workers, with a lower severity rate among the cardiac group. Here again it is felt that there was a psycho-

logical element relating to heart disease that may have influenced the rate, as well as such factors as age, sex, or experience.

Recently, in a job performance study[11] of 2,858 physically impaired and 5,523 able-bodied male and female workers of similar age, experience and occupational characteristics, the authors were able to demonstrate an average accident frequency rate for the physically impaired which was higher than the average accident frequency rate for the able-bodied. An excessive number of accidents in certain physical defect classes contributed heavily to the accident frequency rate of the impaired group. (See Tables 1, 2 and 3.) There was evidence that a psychologic element relating to some types of physical impairments had played an important role in causing significant variations of frequency rates among the several classes of physical defects found among impaired workers in the study. It was our conclusion that the psychologic element also exists among the able-bodied, but has greater significance among workers with certain types of physical defects from the standpoint of prevention of further impairment by second injuries and determining a safe threshold of absorption of physically impaired workers into certain types of industries without raising over-all accident and severity rates or production costs in those industries. It was concluded further that the psychologic element in accident proneness cannot be measured or altered either by ordinary interview or by matching physical capacities or other qualifications to physical and other demands of the job. This element can to some extent be detected before employment both in the able-bodied and in the physically impaired by means of tests which partially measure sensory motor coordination and temperamental stability. The functions measured by these tests have a relationship both to industrial proficiency and accident proneness.

The progress made by industrial physicians in the field of occupational analysis during this war was a long step forward in solving the problem of physical defects as they actually relate to the functional requirements of jobs. Such job analyses provided a basis for matching the capacities of the prospective employee with the physical requirements of the job. It can be seen, however, that this system isolates an impairment in an individual from the rest of his bodily economy and considers that isolated impairment in the light of the requirements of a particular job. Emphasis on a system of this sort tends to cause a situation whereby the psychological make-up of the individual is ignored both in the impaired and able-bodied. It is true that the physical defect could cause an abnormal psychological pattern in the individual, but abnormal psychological patterns are by no means characteristic of persons with organic defects. They are found also in able-bodied persons.

TABLE 1.
LOST TIME ACCIDENT EXPERIENCE OF PHYSICALLY IMPAIRED AND ABLE-BODIED WORKERS BY INDUSTRY[11]

Industry	Frequency Rate		Severity Rate	
	Able Bodied	Physically Impaired	Able Bodied	Physically Impaired
Total	12.26	16.15	0.20	0.21
Aircraft and installations	10.92	17.22	0.12	0.17
Ordnance activities	12.03	15.94	0.20	0.29
Shipbuilding and ship repair	18.84	18.08	0.39	0.24
Other manufacturing	.....	12.89	.....	0.37
Procurement, inspection, storage, supply	36.20	39.68	0.14	0.06
Administrative offices	2.27	.....	0.01	.....
Camps, forts, naval training stations	10.30	14.80	0.38	0.02

TABLE 2.
LOST TIME ACCIDENT EXPERIENCE OF PHYSICALLY IMPAIRED AND ABLE-BODIED WORKERS BY OCCUPATION[11]

Type of Occupation	Frequency Rate		Severity Rate	
	Able Bodied	Physically Impaired	Able Bodied	Physically Impaired
Total	12.26	16.15	0.20	0.21
Craftsmen	16.21	20.80	0.20	0.24
Operatives	11.96	18.48	0.16	0.28
Laborers	15.89	19.60	0.36	0.30
Service	5.46	5.19	0.05	*
Clerical	4.78	7.39	0.07	0.07
Others†	.....	.....	.....	.....

*Less than 0.05 day.
†Includes administrative, professional, semi-professional, technical and scientific workers.

TABLE 3.
LOST TIME ACCIDENT FREQUENCY AND SEVERITY RATE BY TYPE OF PHYSICAL IMPAIRMENT[11]

Type of Disability	Frequency Rate	Severity Rate
Total	16.15	0.21
Amputation of:		
Arm or arms	14.82	0.05
Hand or hands	.....	.....
Fingers	21.10	0.51
Foot or feet	.....	.....
Leg or legs	13.00	0.17
Disability or deformity of:		
Shoulder or hip	30.01	0.22
Spine or back	10.20	0.15
Upper extremities	16.34	0.20
Lower extremities	11.08	0.23
Visual defects	15.86	0.15
Hearing	36.36	0.47
Cardiac	13.07	0.21
Tuberculosis	11.60	0.08
Other	17.23	0.02

Classification with Regard to Accident Proneness

WE CAN roughly classify individuals from the standpoint of accident proneness as follows:

1. The able-bodied with normal psychological patterns, who should present no unusual liability from the standpoint of high accident rate.

2. Able-bodied persons with abnormal psychological patterns and with a history of a large number of minor or major accidents sustained by themselves and members of their families, who show a tendency of taking undue risks while driving, crossing streets, or while engaged in other activities. In this category may be found persons who have made an unusual number of job changes without any apparent advantage and who have a history of inefficiency and unusual amounts of spoilage in their work. Organically, this group enjoys "robust health."

3. The third classification consists of persons who have physical defects and abnormal psychological patterns. In this category the authors have found a large number of persons with digital amputations, either single or multiple, disabling deformities of shoulders and hips causing functional limitation of these joints, and with visual defects, especially with impaired stereopsis, and with hearing impairments. In these cases it is difficult to determine which is the cause and which is the effect of accident proneness, except where the disability has been long-standing or congenital. Hearing impairments beginning in childhood are the cause of many cases of psychological impairment leading to accident proneness.[11] Relation of cause and effect as they pertain to orthopedic disabilities is complex. For instance, it is hard to determine whether an accident-prone man who has had amputation of the fingers suffered such accident because he was psychologically impaired in the first place, or whether accident proneness was the effect of his first accident and resulting amputation. The criterion in this category as to cause and effect appears to be the duration of the

defect as it relates to the individual's accident history.

4. Our fourth category includes individuals with a physical defect and no psychological impairment. All evidence points to the fact that when these individuals are judiciously placed, on the basis of analysis of the functional factors of the job as they relate to the individual's physical capacity, the liability of the individual is as good as that of the able-bodied without psychological impairment.

In setting up the above categories, we have outlined the fundamental problem of industrial medicine as it relates to accident prevention. We say this with other responsibilities of industrial medicine in environmental hygiene in mind, such as heating, lighting, and other factors having a bearing on accident frequency. These environmental problems have been taken care of very adequately in many industries.

The Psychological or Human Factor

THE psychological or human factor outlined in the categories mentioned above remains the outstanding problem. Some of the groundwork for arriving at a solution of this problem already has been laid by physicians. The work of Dr. Vernon has been mentioned. In this country, however, thinking on this subject has been limited so far as medical science is concerned; only a few physicians have given the problem serious thought. The development of psychosomatic medicine to its rightful place in the science of medicine will no doubt expand the amount of investigation which will be done in the field of accident proneness.

The work of Dawson[12] throws light on the problem of physical fitness as it relates to accidents and stresses the importance of the analysis of personality, diagnosis of the component parts of accident proneness in an individual, and the responsibility of the industrial physician in the treatment of causative factors. He points out that after physical evaluation and proper placement in industry there are still a certain number of individuals who have more than the average number of accidents. This is the group whose individual emotional life must be studied, and this is the place where the industrial physician must assume the attitude of the family physician and the psychiatrist.

Dawson cites a personality adjustment study made by the Cleveland Railway Company, in which it was found that in 22% of the accidents studied, improper mental attitude or personality defect was the primary causative factor of the accident. The men in this group were referred to the Superintendent of Transportation who, in an interview, carefully reviewed the facts and reported on each case. An effort was made to give the subject a clear understanding of his personality difficulties and to point out to him frankly why they interfered with satisfactory performance and what the probable outcome would be unless he changed his general outlook and behavior on the job. In most cases the man was placed on probation, varying from 30 to 90 days, and his work performance was closely watched. At the expiration of that period he was interviewed by the Superintendent again and disposition was made of his case. With one exception, all the men showed decided improvement. These facts are significant, since they illustrate the marked influence which apparently unimportant personality traits have on safe operation and show what can be accomplished readily when these problem cases are dealt with intelligently and understandingly.

Selling's[13] comments on this subject are notable. He stresses the importance of psycho-physical testing of persons in industry and indicates that the plant physician will have to shoulder this responsibility with the aid of competent trained personnel workers in the field of psychology. Basically, the tests referred to consist of the following:

1. Reaction time.
2. Distraction and distribution of attention.
3. Visual acuity.
4. Judgment of spatial relationships.
5. Judgment of relative size.
6. Judgment of speed.
7. Practical operating test with observation of confidence, behavior and manipulations.

We see the time in the not-too-distant future when the medical director of an industrial health program will have on his staff a physician who is trained to handle both the physical and psycho-physical aspects of pre-placement examination.

Giberson,[14] in outlining the psychiatric problem in industry, places upon the industrial physician the responsibility for detecting accident-prone persons and accident repeaters. Dunbar[15] indicates that personality profiles may be diagnostically useful in detecting accident habits and proneness. Profiles of accident-prone persons often show that they have an excellent general health record. In this connection, Dunbar indicates that disorders of vegetative functions and other ailments are found less often in the history of accident-prone persons than among the non-prone.

We are quoting the observations of the above investigators with the conviction that industrial medicine has reached its full stature as a medical specialty and that the hiring of medical personnel on a part-time basis to do a full-time job in which there is required a high degree of specialization will no longer be feasible.

Summary

TO SUMMARIZE some of the items which have been discussed:

1. It has been found that between 80 and 90% of all accidents escape the sphere of prevention which the standard safety program in industry provides. The remaining 10 to 20% of accidents are adequately provided for by the standard safety programs in industry.

2. Without denying the utility of the standard safety services in industry as they relate to the 10 to 20% of accidents, we find an enormous problem based on the human element. This human element or factor relates to the individual as a whole and not to the presence or absence of physical defects.

3. It is felt that the health examination administered by industrial physicians should afford a complete evaluation of the candidate for an industrial job. The ordinary type of pre-placement examination does not provide for the complete evaluation of the individual, since it does not usually take into consideration personality factors. Personality factors relating to accident proneness cannot be measured by ordinary interview, nor can they be altered by ordinary physical examination or by the matching of the physical capacity of an individual to the requirements of a job as determined by job analysis. Personality, however, is a tangible factor which can be diagnosed as it relates to accident proneness. This diagnosis can be based on a combination of a thorough accident history supplemented, as required, by psycho-physical, estheto-kinetic or sensory motor tests. Practical application of the tests should be made in order to furnish the field of industrial medicine with experience which can be used as a basis for further evaluation and improvement of the tests. Their use will depend upon the specialized services which are generally available under industrial health programs. The tests, as part of the complete

health examination, should not be used as a tool to deny employment; rather, they should be used as a basis for treating individuals who are accident-prone and assigning them to less hazardous occupations or placing them under closer supervision in their regular occupation.

4. The type of examination described above, used in conjunction with a system of job analysis, will afford a sound basis for the use of a pre-placement examination from the standpoint of preventive medicine. The pre-placement examination can then be used without fear of antagonizing labor or management. Its use can be clearly demonstrated to be in the interest of the economic welfare of the worker and the rights of management.

5. Adequate safety programs and adequate industrial health programs can be developed concurrently. By coordination of the two preventive services in industry, there can be achieved a reduction in the millions of man-hours and dollars lost because of accidents and, more important, a reduction in loss of life by accidents, which at present closely rivals loss of life in warfare.

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A British Industrial Health Service

THE committee of Britain's Royal College of Physicians on social and preventive medicine has devoted the past year almost entirely to the subject of industrial medicine and reform, and has now issued a report. The industrial production of Great Britain must be efficient; it cannot be efficient unless the conditions of work guarantee the highest level of physical and mental health. A large majority of citizens spend a third of their working days in factories, offices, shops, transport undertakings, or catering establishments, and the case for the creation of a comprehensive industrial health service seems overwhelming.

The report points out that, in health matters, home and workplace are interlocked and interacting. They are parts of the same common environment. Again and again the need for coordination is emphasized. Prominence is given to university centers of teaching and research where medical graduates differently employed can barter the results of different experiences. The hope is expressed that many young physicians and surgeons at present in the British forces or in the enlarged factory medical service provided for war industry will find an interest in industrial work. It is urged that an industrial health service should be planned boldly without much regard for traditional arrangements. Factory legislation should be strengthened and extended in order to provide for the needs of smaller industries and non-industrial undertakings. The industrial health service should moreover, it is argued, be an essential part of Britain's National Health Service with the ultimate responsibility for it vested in the Minister of Health and the Chief Medical Officer of the Ministry. There should be uniform conditions of service, rates of remuneration, pensions, and so forth. General administration might be delegated mainly to the Ministry of Labour and National Service, but for certain special purposes in special industries administration might still be carried on within the general framework of the Service by such bodies as the Ministry of Fuel and Power, the Ministry of War Transport, or the General Post Office.

The existence of special technical problems in each industry or undertaking appears to make some such delegation essential. The industrial health service would be organized on a regional basis in close association with the National Health Service. If hospital organization and planning are developed on a regional basis with the universities playing an important part, the industrial health service would also have regional links with the suitable university departments and institutions. The recent announcement of the creation of three such university departments in industrial medicine by the Nuffield Foundation is welcomed as a definite step towards the kind of development that the committee has in mind.

Any health organization at a lower level in, say, joint local authority areas, should have appropriate machinery for close association with the industrial health service.

After sketching the historical background of the problem and the scope of the existing medical services the committee declares that the future of British industry, and thus the prosperity of the nation, are dependent upon a maximum efficiency. This can only be achieved by securing a high standard of health among the workers.

It is therefore recommended:

That an industrial health service be planned as an integral part of the National Health Service with arrangements for close association at all levels, central, regional, and local, with other branches of the National Health Service.

Such an industrial health service should be national in its scope and apply to every variety of employment.

Such an industrial health service should be staffed by medical inspectors, consultants in industrial medicine, whole-time and part-time medical officers, together with the necessary non-medical personnel, all of whom will have received training suitable for the type of work undertaken.

The essential feature of administration of an industrial health service should be a close association everywhere with the body responsible for the peripheral administration of the National Health Service and with university departments of industrial health, where such exist.

As originally appearing in the London *Times*.

Clinical facilities, including beds for the consultants and research workers in industrial medicine, should be provided.

The aims of such a service should include the promotion of the general health of the worker by the provision of optimum environmental conditions, and by fitting the worker into such conditions; the prevention of disease and accidents in industry; the taking of an appropriate share in the rehabilitation of the disabled workman; and the education of the workers in the preservation of health and promotion of well-being.

Research in industrial health should be given every possible encouragement administratively, and by the industries themselves.

THE conviction which has guided the committee in the preparation of the report is that, without the fullest cooperation of employers, workers, and all members of the medical profession no efficient health service can exist. One of the immediate requirements of the people of this country is an industrial health service which includes provision for all who need it most—not merely the large and complex industrial concerns but also the small factory and work-place, the building industry, the transport services, offices, hotels and catering establishments. The industrial health service must be comprehensive and national in scope. If this view is accepted, it is clear that the family doctor has a vital part to play in the service as a part-time industrial health officer, and that he must be trained for this function. It is equally clear that there must be a nation-wide service of medical officers of consultant rank specialized in the problems of occupational diseases and of industrial health. The committee appreciates the desirability of appointing whole-time industrial health officers for the larger industries, and in suitable cases a combination of full-time and part-time service. But it emphasizes the view that in a comprehensive industrial health service the general practitioners who will be in the front line of the proposed National Health Service, "the first source of help on which the individual will rely," will also be the main body of the industrial health service.

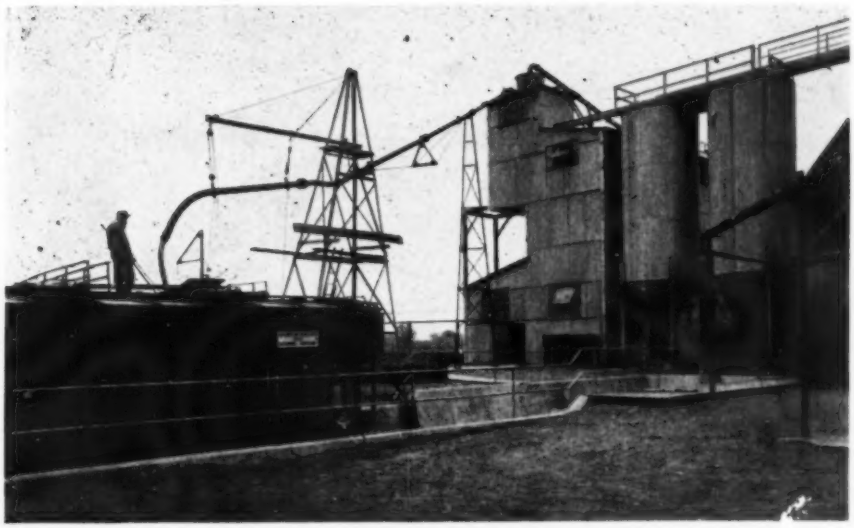
Fitting the individual worker for his job will entail enquiry into his physical and mental capacity, as well as knowledge of what is required for efficient and safe performance of the jobs available. The doctor's share in selection and allocation is not restricted to those entering industry for the first time. It is equally necessary when workers enter a new occupation or branch of work—perhaps because of illness. The degree of precision with which the worker can be matched to his job need not be such as to call for minute physical and psychological examination, but the tests should be sufficient to avoid the waste and damage to health caused in the past by permitting misfits to enter unsuitable work. In the prevention of occupational diseases clinical consultants and scientific research workers must take an increasing part. Investigation and medical care should be organized both centrally and regionally. In this respect the industrial medical officer acts as general practitioner, supported by ready access to the specialist and the laboratory.

On rehabilitation the report says it will be impracticable to secure efficient facilities and methods of rehabilitation and re-settlement without the closest ties between the national health and industrial services. In the committee's view the final stages of the restoration of the disabled should be carried out at the place of work, and the service should make full use of the industrial medical officers. It is emphasized that an industrial health service must be a cooperative undertaking to ensure success. The key personnel must be trained either as doctors or as special auxiliaries, such as nurses and welfare workers, but they can only be successful if they work in the closest cooperation with both management and employees. The formation of joint management-labour committees is suggested as a means of obtaining the cooperation and confidence of the workpeople and management and giving the service a firm basis.

On the remuneration of medical personnel of the industrial health service the report admits that it is necessary to dispose of the point of view that industry cannot afford a health service. Industry cannot afford to be without a health service if efficiency and output are to be maintained. The most obvious solution for the financing of an industrial health service is for the personnel to be paid directly by the industry itself. Objections to this have been shrewdly raised on the grounds that workers will be suspicious of medical officers who are paid by, and are therefore directly responsible to, the "management." It is possible that if a close link between a national health service and an industrial health service is obtained, as this report urges, the payment of medical and other personnel might be made part of the general "health budget."

On the education of medical staff the report says that, for the medical man or woman who wishes to take up industrial health as a career and to become a whole-time industrial medical officer, it is essential that training should be founded on a broad study of preventive and social medicine, in order to avoid too narrow specialization. A special course of instruction in industrial health should be preceded by at least two years' post-graduate experience in medicine, of which not less than one year should be spent in general practice. Whether a special diploma in industrial health is instituted or not, there should be a well designed course of academic and practical training of one year's duration. On research work it is pointed out that up to the outbreak of the present war the Industrial Health Research Board carried out pioneer work which promised great benefits to industrial organizations if the findings had been more widely applied, especially in the small industries.

The urgencies of war have brought about a great change. After the war there will be an increasing need for industrial health research in both field and laboratory, and probably an increasing tendency to encourage studies which have an immediate application. But it is of the greatest importance that these practical and applied investigations, valuable as they are, should not be allowed to obscure the need for more fundamental research. This is particularly true at the present time, when teaching schools are considering the creation of departments of industrial health and the establishment of chairs at universities. University departments should have special facilities for undertaking fundamental research. In the opinion of the committee, research should be carried out at three levels. An industrial health research board, responsible for investigating problems of national significance. University teaching schools which establish departments of industrial health should be charged with fundamental research, including field investigation, especially in relation to the problems of their own region. In each local administrative area of the National Health Service there should be a division for investigation in close liaison with the industrial health research board and the local factory department on the one hand, and with universities and local industries on the other.



Pneumatic unloading of arsenic

Practical Preventive Methods

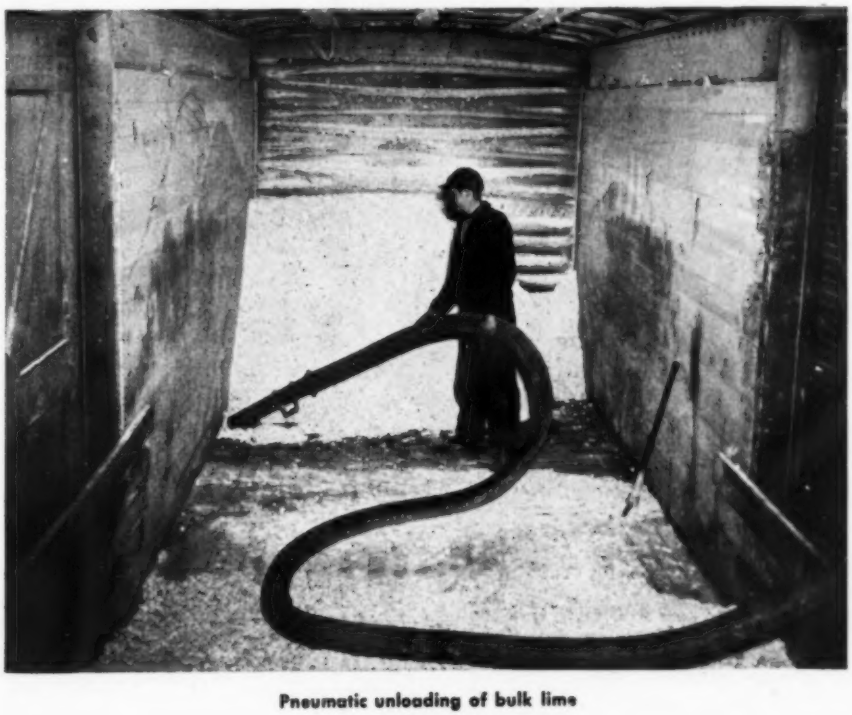
—An Insecticide and Fungicide Manufacturing Plant Does Double Duty in Helping to Protect the Nation's Food Supply and Its Own Employees—

C. O. SAPPINGTON, M.D., Dr.P.H.,
Industrial Health Consultant,
Chicago

FROM the dawn of time man has waged a continual warfare against crop pests. In the beginning, little was known of the pests themselves, and efforts were directed toward mechanical control, either by direct removal of the insect and affected part of the plant or by the use of repellants. Even charms and magic were employed extensively. The rapid advance from hit-and-miss methods to today's scientific and effective dusting and spraying control measures has actually taken place in the past half century.

The grape mildew, Colorado potato beetle and the San Jose scale probably stimulated the development of chemical measures of pest control more than any other group of factors. A solution of these problems resulted in the development of the so-called Bordeaux mixture, arsenicals and lime-sulphur. Sulphur and copper continue to be the most important fungicides for disease control, while arsenicals are still the predominantly-used insecticides.

Insecticides now consist of a wide variety of materials, many of which are designed for specific purposes. Nicotine has long been used as a contact insecticide. More recently, rotenone, pyrethrum and dinitro materials have become popular for the control of certain insects. Oil sprays have replaced sulphur sprays in many instances for dormant use. While lead arsenate is generally used on fruit for insect control, calcium arsenate has been developed for general use on potatoes, vegetables, and cotton. Fluosilicates are also used to control certain insect pests. There are many others, but the foregoing insecticides are considered the most important in general use today.



Pneumatic unloading of bulk lime

Constant research has brought about greater efficiency in control through combinations of materials in the same application, and the use of different materials during the season. Pest-control programs must also be far more thorough than in the early days, but the resulting bigger and better food crops are the rich reward.

An important development of recent years has been a better understanding of the effect on the plant of the materials used in pest control. This has led to increased usage of what are called "non-caustic" materials which permit the foliage to develop more normally and also provide effective pest control. These "non-caustic" sulphurs for disease control are supplanting lime-sulphur, leading to larger crops and increased production. Similarly, the "insoluble coppers" have replaced Bordeaux mixture on fruit and vegetables to a considerable extent.

Methods of application have also undergone considerable improvement. Dusting is growing considerably in popularity and is of increasing interest under present-day conditions where labor saving is essential—dusting is widely used on fruits, vegetables, cotton, and other field crops. These methods have supplanted the earlier methods of application, where liquids were applied with a whisk broom or dust materials were thrown on the plants by hand. Gasoline engines have also figured in the modern spraying and dusting equipment, which is streamlined and powerful, although efficient hand sprays and dusters have been designed which are satisfactory for use in small gardens.

Our recent war experiences where troops have been in contact with malaria and typhus-ridden areas has brought home dramatically to the average American the importance of insecticides. The outcome of several military encounters throughout history has been de-

cided, not by guns nor superior strategy, but by the ravages of disease, according to John A. Rodda, Chief, Insecticides and Fungicides Unit, Chemicals Bureau, War Production Board.

It is to be borne in mind that supplies of materials for these compounds vary with the fortunes of war, the exigencies of munitions production, and importations.

There is no "miracle" insecticide which will control every type of insect, and there is no single fungicide which will eliminate or prevent every type of plant disease. Many types of both compounds must be used specifically to combat the threat of disease to man, as well as to animal and plant life.

Many individuals are contributing to the accumulated knowledge of insect control, such as entomologists and plant pathologists who study the life histories of insects and diseases and work out methods to prevent insect devastations—chemists who compound mixtures which of course must eliminate insects and plant disease without causing plant injury—engineers who design equipment for the prompt application of the various compounds—plant breeders who develop varieties or strains of plants which are resistant to insects and plant disease. Colleges and universities are also offering special training courses, and literature covering every phase in the control of insects and diseases is widely distributed, as Mr. Rodda has well stated in his recent article in *Chemical Industries* for March, 1945.

Research center experimental greenhouse

Section of research laboratory in research center

According to Dr. F. C. Bishopp, of the Bureau of Entomology and Plant Quarantine, manufacturers can save themselves much time, money, and trouble if they can answer fully and satisfactorily the following questions about their products:

1. How effective are they for killing insects?
2. What is their toxicity to higher animals and man, by contact and by oral ingestion?

Litharge department. Note ventilating pipes on various machines

3. What is their toxicity to plants and the soil?

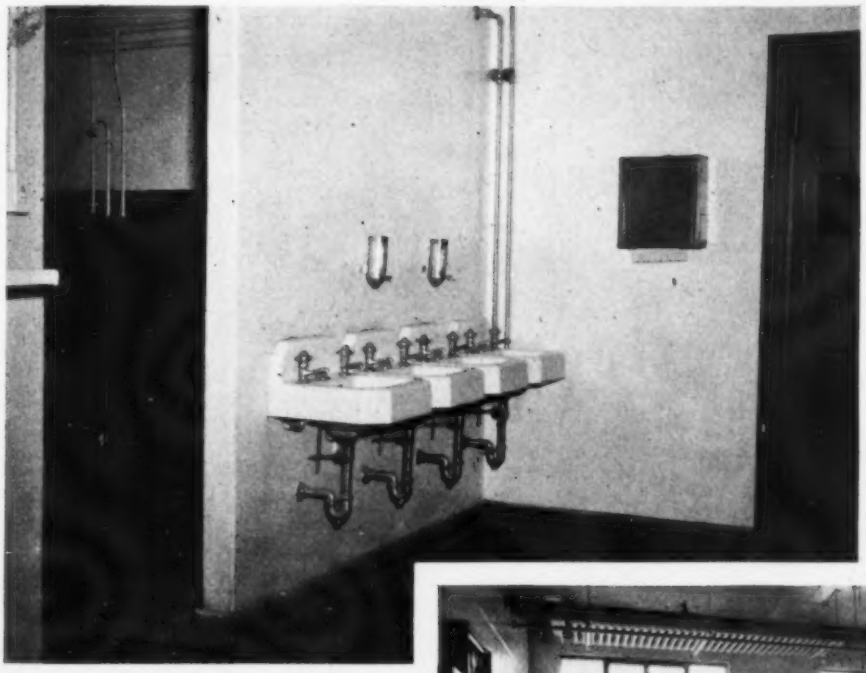
4. Can they be compounded in such a way as to make them satisfactory for application under the many and diverse conditions under which an insecticide is used?

5. Are they compatible with the common fungicides? In many cases it is desirable to compound an insecticide with materials to control plant diseases.

6. Can they be applied with standard equipment? Under wartime conditions this is especially important, since new methods and equipment cannot easily be developed.

7. What are the limits of their usefulness? The universal insecticide is just about in the same class as the universal solvent.

Section of chemical department locker rooms



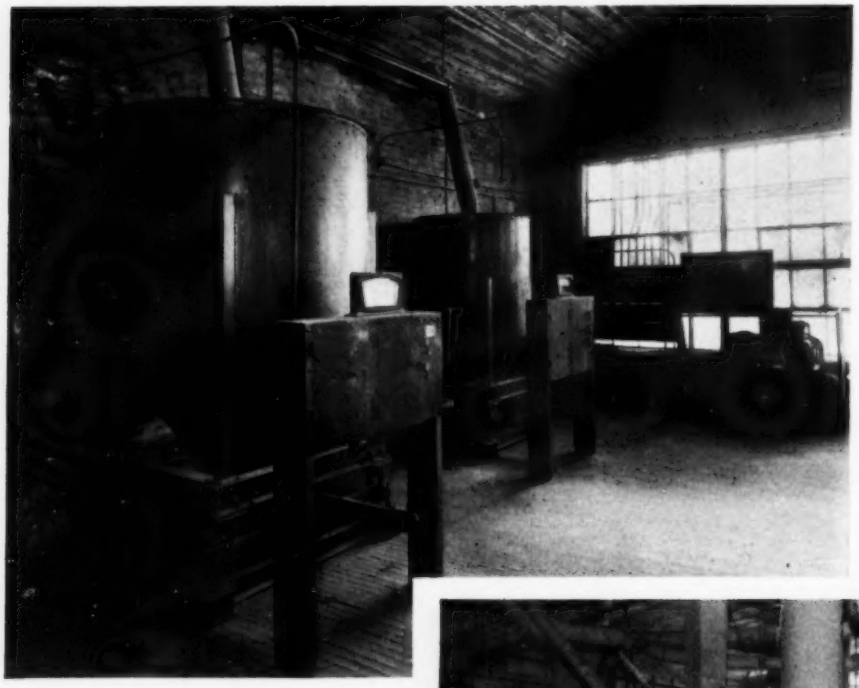
Section of chemical department wash room

Organization of Present Group

ABOUT 1905 a group of local citizens of Middleport, New York, located in the heart of the western New York fruit belt, organized a corporation known as the Niagara Sprayer Company to promote the invention of a spraying machine for making applications of insecticides and fungicides primarily to fruit trees.

Shortly after this time the chemical lime and sulphur solution (calcium polysulphide) came into use in the Northwest as a spray for fruit trees. Being aware of this, the Niagara Sprayer Company brought to Middleport one of the technicians associated with the western production of lime and sulphur solution, and in the vicinity of Middleport erected a lime and sulphur solution manufacturing plant. This was the first chemical production by the company and the first lime and sulphur solution to be made for spraying purposes in the east. This chemical is still a standard product used annually by thousands of fruit growers. The location of production in western New York was important because in that period western New York was the most prolific producer of apples and peaches in the country and offered the best market for spray machines and spray materials. From this begin-

Section of chemical department lunch room

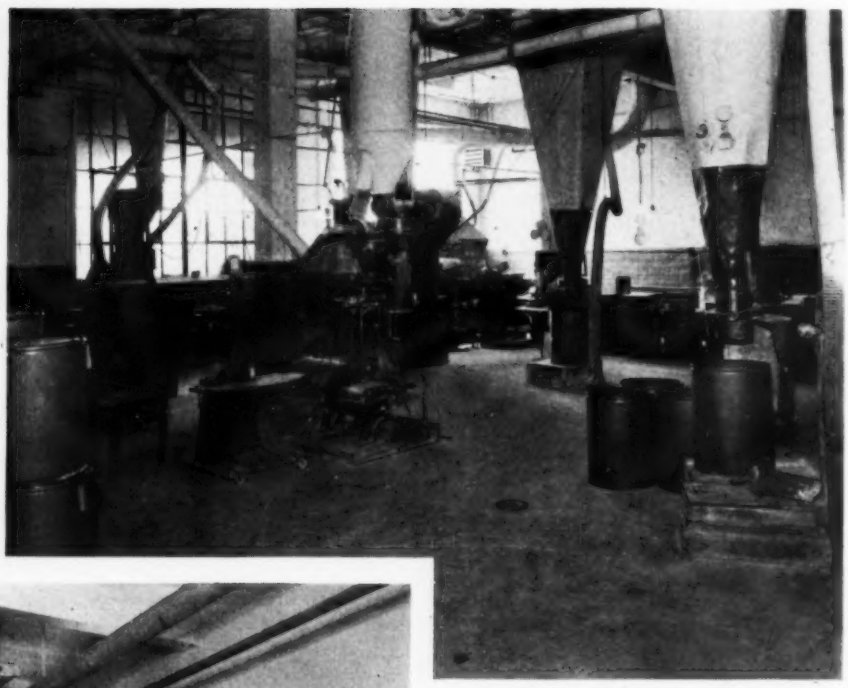


Automatic weighing and handling of bulk lime and litharge

ning, the company gradually expanded its operations in western New York into the nearby Hudson valley, Pennsylvania, Ohio, and Michigan, adding from time to time new chemical products to its line of products.

About 1915 the company, which by this time had established a research and technical service department of its own, began in cooperation with certain experiment stations a development of the dry dusting method, relative both to its chemical and machinery phases. These enterprises carried interest beyond the borders of territory previously covered and began the development of a national business in dusting machines and dusting materials as they gradually found utility in all sections of the country where crops are grown.

In 1919, as a result of the ravages of the boll weevil in the cotton belt and the discovery of calcium arsenate by the U. S. Department of Agriculture as a control for this pest, a large and modern chemical plant was erected at Middleport for the production of calcium arsenate and other arsenical compounds, and a large modern machine shop was built to produce the correlating machinery for the application of the materials to crops. This step marked the final expansion of the



Arsenical packing department. Note ventilating pipes on machines at left

Section of chemical department shower room

small local corporation into a nationally known organization with leadership in the field of cotton insect control and dusting.

Further expansion and extension of technical operations continued to 1928 at which time the company was reorganized and assumed its present name of Niagara Sprayer and Chemical Co. Inc., which has since maintained operations in Canada, Florida and Texas. During the period of the last ten years, production facilities at the Middleport central plant have continuously expanded through the development of new products and this unit now represents one of the largest single insecticide and fungicide producing operations in the country.

Employee Protection

ACCORDING to present industrial hygiene conceptions, this plant would be rated as a "small" plant as the present payroll is about 285, with less than 280 persons engaged in manufacturing operations.

Realizing that the important exposures appear to be contact with lead compounds and calcium salts, the company had an industrial hygiene technical survey made by the New York State Department of Labor Industrial Hygiene Division, under the direction of Dr. Leonard Greenburg. The company officials have been active in carrying out protective measures, as can be seen by the photographs accompanying this article, which show that the latest type of ventilating equipment and methods of handling materials are used in order to minimize the intensity of the exposures. Emphasis is also placed on personal cleanliness, orderliness, and good housekeeping.

Periodic blood examinations have been carried on for some time, particularly with reference to the group of men and women employees exposed to lead compounds.

Routine pre-employment examinations are conducted on all applicants for employment, with recommendations regarding proper placement.

Regular safety inspections are made frequently. Two first aid rooms are maintained by an intelligent and competent first aid man who has had certified training in this phase of the work.

Four physicians are available for "on-call" services.

THIS "small" manufacturing organization therefore, represents a good example of a group which is applying modern methods of research and technology in the production of materials, compounds and apparatus useful for protecting the food supply of the nation, while at war and in peace; supplementing these methods by modern procedures designed for the protection of the employees in the manufacturing and production of the important compounds used as insecticides and fungicides. The history of the company shows that a distinct advance has been made in carrying on these activities and indicates that additional research and study will continue to bring improved methods of protection for both fruit and vegetable crops, as well as of the employees engaged in the manufacturing operations.

More important than the immediate apparent advantages resulting from these procedures are the improved industrial and public relationship values accruing to employees, management and the community.

These values notably demonstrate the vital benefits which can be shared as the results of such a co-operative undertaking.

Medical Service in Industry

EMMET DWYER, M.D.,
Regional Medical Officer,
Canadian National Railway, Western Region,
Winnipeg, Manitoba, Canada

THERE is great variation in the scope of the medical service required by different industries. At one extreme there is the small factory or business where a doctor is "on-call" in the event of some major emergency and where he may be engaged to come once a week to examine the employees in connection with some specific industrial hazard such as lead poisoning. At the other end of the scale an industry in an isolated locality may find it necessary to provide its employees and their dependents with a complete medical and hospital service. Last spring, in Chicago, I attended a Congress on Industrial Health where I had an opportunity to hear DR. SIDNEY GARFIELD, Medical Director of the Kaiser industries, describe the very complete type of health service provided for tens of thousands of employees and their dependents in the shipyards at Oakland and Richmond.[1] Between these two extreme examples of medical service in industry there are many other kinds. I will not try to describe the differences that must exist, depending on the size and location of your plants and on the type of work you are engaged in. Rather, it is my hope to indicate for you the purpose, the organization, and the operation of the medical department with which I am associated.

INDUSTRIAL medicine was founded on the need for individual treatment of industrial accidents and occupational diseases[2] but over a period of 30 years or more of steady growth its objectives and responsibilities have continually widened so that today it is not, I think, unfair to say that the essential purpose of a medical department such as ours in The Canadian National Railways and in Trans-Canada Air Lines is, and must be, to keep the individual worker fit. If I might offer a suitable slogan for an industrial medical department I would suggest the words, "We Aim for Health."

As a physician serving industry, the plant medical director must understand a good deal about the principles of management and of labour relations. He must be familiar with the industrial processes carried out in the plant he serves in order that he may be in a position to recommend preventive measures against the industrial hazards such as lead poisoning, dust diseases of the lungs, carbon monoxide poisoning, primary skin irritants like gunk and varsol, and the many other toxic or irritant substances that are essentials in modern industry. He must plan for first aid, accident prevention and sanitation. He will conduct routine examinations for various specific purposes and he will be called on for advice in placement and rehabilitation problems. He will meet, not infrequently, with lawyers, claim agents, and compensation boards, and will be expected to assume numerous and diverse duties that may extend far beyond the ordinary limits of matters medical but that have usually, in the final analysis, to do with problems of personnel.[3]

I am not, of course, suggesting that we doctors in industry are specialists in everything. In organizations like The Canadian National Railways and Trans-Canada Air Lines advice is available from experts in nearly all types of industrial and professional work. As pointed out recently by MR. CHARLES F. KETTERING, the brilliant Director of Research for the General Motors Company, it is ordinary people like you and me, with ordinary abilities, who may reach positions of responsibility by practice or study or plain persistence, who working in groups or in an organization do much more of the world's work than do the rare intellectual prodigies.[4] However, in spite of so much non-medical assistance, the doctor in industry must still know and treat his patients and spend many of his evening hours studying subjects that the majority of physicians or surgeons do not have to concern themselves with.

Address delivered January 22, 1945, before the University of Manitoba Evening Institute Training Course in Industrial Accident Prevention.

AT OUR HEADQUARTERS, in Montreal, is our Chief Medical Officer, DR. K. E. DOWD. He has other doctors assisting him in certain branches of the work such as, treatment, examinations, etc. In Montreal, too, there are part-time consultants in internal medicine, surgery, eye, ear, nose and throat work and certain other specialties. They are all outstanding men in their particular work and their advice and co-operation is available to, and is freely used by, our company doctors from one end of the system to the other.

The headquarters staff, in addition, includes nurses, technicians, clerical and statistical help, and also the system supervisor of first aid and a sanitation and public health expert.

In Montreal we have a main down-town treatment centre and health centres in the several shops. The clinic, proper, has a physiotherapy department, well equipped with the modern electrical aids to remedial treatment and massage and with a professional masseur in charge. Worthy of note is the laboratory where trained technicians do blood examinations, urine tests and whatever other work of a like nature is required by the doctors as well as investigating the quality of milk, water, soaps, and many other supplies used by the company or developed by the first aid or accident prevention branches.

Outside of Montreal, there are regional medical headquarters at Toronto, Detroit and Winnipeg, and clinics with full-time or part-time doctors in charge at these and at other large centres. At most divisional points and at other places of importance we have on call the best available doctors, and we consider that the selection of the best doctors is a very important detail of our service.

Here, in Winnipeg, three doctors work with me in our main clinic. Our offices are well equipped to serve as a treatment and advisory centre. Routine dispensary and laboratory work is done by a nurse. We have electrical treatment aids such as short-wave and quartz lamp therapy machines. We take and develop our own x-rays and make frequent trips to our outside health centres at Transcona and Fort Rouge shops as well as at Stevenson Field. At each of these points one nurse or more is on duty and, of course, we constantly engage in a first aid program at these places as well as all over the region so that the full time of two members of my staff is thus occupied.

We have one travelling doctor who reports to my office but lives and works in a medical car that goes from place to place across the western region of the railway. At Edmonton and Vancouver we maintain part-time treatment centres, and through our district medical officers and consultants at some 120 or more centres between Armstrong and Victoria, and including the cities on our railway in Minnesota, we are prepared to treat emergencies of all kinds and to give a complete service in accident cases.

YOU MAY wonder how we keep busy in our Winnipeg clinic. It has been the experience of the U. S. Health Service that, in certain types of industry, at least, one whole-time physician is required for every 2000 employees and a trained nurse for about every 500 persons.[5] Such standards anticipate the medical department averaging four visits a month from each employee. In the transport business we have not yet come to feel the need for so much medical service. We share the doubt that seems to exist in society as to how far industry should go in handling the medical affairs of its employees. We are trying to keep in the middle of the road. We are not attempting to run a medical service complete in every detail. We offer full care of industrial accidents and illness, and, in addition, treatment of ambulatory illness only partly to try to keep the worker on the job but also to further the patient-physician relationship. As a matter of fact, and as pointed out in a recent article by Ward, it is, in actual practice, difficult to refuse to give treatment for illness at a company health centre. There is a constant demand from the employees for such treatment and its value is apparent to all concerned. Moreover, the borderline between the advice given to prevent illness and that given to relieve symptoms already established is a hazy and ill-defined one.[6] However, we do not follow the sick employee into his home but, instead, refer him to his family physician with whom we are always ready and anxious to cooperate whether by communicating our findings and opinions to him, or by trying to get special consideration at work for his patient when such is indicated.

An employee's first contact with the medical department, however, comes at the time of his pre-employment examination. We are not attempting by these examinations to assemble a force of supermen nor to employ only 100% fit men and women. The objective of the examination is the placement of the worker at the job he is suited for. Much of the work in the transportation industries is moderately heavy and involves certain risks to the worker. We cannot assign to such positions physical or mental misfits who might be undue hazards to themselves, to their fellow employees or to the travelling public. During the war years some relaxing of standards in certain directions has been inevitable, but for certain very responsible jobs, e.g., the operation of commercial aircraft, we have not been prepared to lower our standards by one iota.

Just as we size up the individual at this pre-employment examination, so he sizes us up and decides whether or not he likes our medical service and perhaps, too, the company he is going to work for.

Having certified a new man as fit for a particular job we then wish to keep him fit and, if necessary, encourage him to correct any factors of ill health with which he may be troubled. To accomplish these aims we periodically re-examine various groups of our employees. In Trans-Canada Air Lines, in addition to the very much more frequent examinations of certain groups, e.g., pilots, stewardesses, despatchers, radio operators, battery workers, instrument room personnel, sandblasters and others, we examine everyone in the employ and including the executives, at least every two years, and these examinations are not at all casual and, of course, those conducted on flying personnel are as searching as can be.

On the railway, men whose work brings them into contact with actual train operations undergo eye, ear and physical examinations at least every two years. Defects noted at these examinations are drawn to the individual's attention at the time and a follow-up letter listing the disabilities is subsequently mailed to him at his home. We think that the lady of the house may sometimes be more successful than we have been in convincing her husband that he should place himself under medical care if indicated. The defects we find at these periodic examinations represent, as you will easily realize, a cross section of all the ills to which flesh is heir, and we take considerable pride in knowing that many of our employees are today alive and well and engaged in their usual or in some other suitable occupation because of the fact that a periodic examination enabled us to give them appropriate advice in good time in connection with conditions such as

heart disease, kidney disease, diabetes, or other ailments amenable to treatment.

Other employees, individually or as groups, are periodically examined at varying intervals and for various reasons, e.g., food handlers, for obvious reasons, are required to have an examination every three months and within the past year we also arranged for a chest x-ray and a blood test of everyone of the approximately 800 members of this group in our service in Winnipeg.

Other examinations carried out include those on applicants for extension of service past the usual retiring age or on individuals whose health is such that they feel they must request their pensions before the normal retiring age. Men out of service over six months, or sometimes less, must be re-examined before resuming duty. Persons transferring to jobs carrying possible extra hazards likewise receive an examination before starting in on such work, and then from time to time as may be indicated. For example, it was only last month that we x-rayed the chest of every man employed in our local foundry and in connection with such activities we step right over into the field of accident prevention in recommending methods of dust control and eye protection, measures to protect skin from industrial irritants, etc. What we are doing in such matters is saving our men from a great part of the suffering and disability that used to be associated with such types of work.

Right here I should perhaps make clear to you that all the information we assemble on a man is held strictly in confidence, even from his supervisors to whom any necessary report on his condition is made only in terms "Fit" or "Not Fit." It is only on rare occasions, e.g., where the welfare of other employees, or an unjust claim for injury might be involved that any modification of this rule occurs.

A medical control program in industry must, of course, fit in with the company's administration and must also satisfy the employees. Successfully to accomplish both these things may at times present difficulties, but by recognizing conditions as they actually exist, not as they might be, by keeping out of disputes, and by "calling the balls and strikes" as he sees them, there is every reason for the doctor in industry to look forward to pleasing the great majority of those interested in his service.

The individual worker is, of course, the basic concern of the medical department, but in conducting a medical service for industry, whether it be for a wealthy established firm or a struggling new business, the doctor must demonstrate that the service pays. It should pay in dollars and cents; in employer-employee relationships; in increased efficiency of the workers; and in a lower accident rate and shorter disability periods. The National Association of Manufacturers in the United States reports[7] that adequate plant medical programs have reduced accident frequency by 45%, absenteeism by 30%, occupational diseases by 63%, labor turnover by 27%, and industrial compensation insurance premiums by 29%.

A few other, often repeated, figures that might interest you are these:

1. Lost time in industry on account of industrial accidents or occupational diseases normally amounts to one day per man per year.

2. Industrial accidents are responsible for only about one-tenth of the time lost from work by reason of ordinary illness.

3. Occupational diseases account for only about 1% of the cost of compensable accidents.

4. Time lost because of sickness, non-industrial accidents and for personal reasons ordinarily totals about nine days per man per year and about 12 days per woman worker per year.

5. When a workman stays away from his work for a day he of course loses his day's pay, and it is estimated that his employer loses one and a half times the man's daily wage.

I HAVE NOT planned to discuss treatment of accidents with you, tonight, but I think most people are unaware that for every industrial accident needing hospitalization and skilled surgical care there are more than a hundred of the type which, happening at home or elsewhere, would never receive medical care at all. In the aggregate, though, because of the factor of infection, such accidnts exact a frightful toll in suffering, expense and time lost, and the industrial physician must see to it that the employees in his care are educated to report trivial injuries and to seek treatment for them. He must, of course, furnish proper care for these scratches and splinter wounds, bruises and sprains, foreign bodies in eyes and wrenched backs, as well as for the many other comparable mishaps that will occur, week after week, in the average busy plant.

The plant nurse who often first treats these cases must have excellent surgical nursing skill along with good common sense and tact and the ability to get along with people. To be successful, she must have many other attributes also, and these must include the ability to understand the problems of management and supervision as well as those of wage earners and in some instances, to act as an adviser in promoting mutual understanding between these groups.

The industrial physician, himself, must care for the minor injuries, referred by his plant nurses, and he must accurately recognize his own limitations and be prepared to seek advice from specialists in other kinds of medical work whenever such assistance is indicated. He must, himself, however, in all instances accept responsibility for the policies of the medical service and for the treatment accorded every employee who has sought advice or care from the company's medical service.

In short, what we in industrial medicine are trying to do by an evolutionary process, because we haven't evolved our final product yet, is to make it fashionable to stay well, to work safely and efficiently, to protect earning power and to seek a great deal more medical treatment than the majority of men would ordinarily obtain were it not for the urging of the industrial medical department.

In our own organization we aim to treat each man as if he was a private patient and to handle him in just the same way as we would the head of the company. We have no use ourselves for a half-way more or less neutral medical organization and with the cooperation of our employees we aim to give a medical service that is second to none.

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Non-Occupational Absenteeism

—A Statistical Analysis—

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THE MAIN purpose of industrial health supervision is to keep the employee healthy. The higher a continuous standard of health maintained over long periods of time, the better can production be in quality and quantity. Such a program involves not only the curative measures incident to the practice of industrial medicine and surgery but also the principles and practice of industrial health promotion.

Studies on absenteeism, lost time and disability among industrial employees have been conducted by Sappington,[1] Brundage,[2] Sydenstricker,[3] and Sayers[4] of the U. S. Public Health Service; Selby,[5] Medical Consultant, General Motors Corporation; Lanza,[6] Metropolitan Life Insurance Company, and many others. All agree that about 90% of the time lost in industry is due to non-occupational illness. They emphasize the tremendous industrial effect of such lost time in causing great financial and productive losses to both employers and employees. Yet in all these studies, Sappington has so far been alone in calling attention to the short-term illnesses as a leading factor in increasing financial loss to both company and employee. It is obvious that until measures are taken to reduce successfully the incidence of non-occupational illness, the industrial medical department has failed dismally in its purpose.

This study was undertaken, not with the thought of presenting a new subject, but in the hope that it would be of some value in helping solve the problem of non-occupational absenteeism in industry. We also have included periods of lost time of three days or less in order to throw some additional light on the subject.

SINCE its inception several years ago, the sickness and accident club of this company has issued monthly and yearly statements showing the total amount of premiums raised and the benefits paid to the insured employees because of non-occupational illnesses and accidents. Over the two-year period covered by this study 67% of the employees were insured and collected 88% of the total benefits paid out because of non-occupational illnesses and accidents. Of the total benefits paid out to the insured, 75.3% were for non-occupational illness and only 13.2% were for non-occupational accidents. The remainder constituted death benefits.

To be sufficiently inclusive we have traced back all of the available lost time records from January 1, 1939, to January 1, 1941.* During this period there were 3842 medically recorded cases of lost time. Of these records only 2420 were useful for this study. The other 1422 cases were omitted because the records, as found, were incomplete in one or all of the following details: (1) no record of age or race; (2) no record of occupation, type of work or place of employment; (3) no diagnosis; (4) no record of date of onset of illness, date of discharge from medical supervision or date of return to work.

TABLE I.

	Recorded Period of Absenteeism											
	1 day		more 1 less 3		3 to 8 days		8 to 31 days		over 31 days		Total	
Age Group	C*	%	C	%	C	%	C	%	C	%	C	%
18–25	43	7.3	56	9.6	250	42.8	198	33.9	37	6.3	584	24.1
26–35	92	11.1	73	8.8	312	37.6	286	34.5	65	7.8	828	34.2
36–45	59	10.7	42	7.6	188	34.2	213	38.7	47	8.5	549	22.7
46–55	34	10.5	27	8.3	107	33.1	119	36.8	36	11.1	323	13.3
over 55	12	8.8	8	5.9	47	34.5	47	34.5	22	16.1	136	5.7
Total	240	9.9	206	8.5	904	37.5	863	35.6	207	8.5	2420	100.0

* C—actual cases recorded.

TABLE II.

	Recorded Period of Absenteeism											
	1 day		more 1 less 3		3 to 8 days		8 to 31 days		Over 31 days		Total	
Department	C*	%	C	%	C	%	C	%	C	%	C	%
Mines	55	7.7	57	7.9	210	29.4	300	42.0	92	12.8	714	29.5
Mills	49	10.2	49	10.2	198	41.2	148	30.9	34	7.1	478	19.8
Furnace	40	16.5	16	6.6	87	35.9	71	29.3	28	11.5	242	10.0
Maintenance	20	9.3	24	11.1	102	47.4	60	27.8	9	4.1	215	8.8
Yard	2	1.1	13	7.3	64	36.3	80	45.2	18	10.2	177	7.3
Transportation	19	11.0	11	6.3	62	36.0	71	41.2	9	5.2	172	7.1
Open hearth	25	15.3	12	7.3	62	38.0	54	33.1	10	6.1	163	6.7
All other	30	11.5	24	9.2	119	45.9	79	30.5	7	2.7	259	10.8
Total	240	9.9	206	8.5	904	37.5	863	35.6	207	8.5	2420	100.0

* C—actual cases.

TABLE III.

	Age Group Distribution											
	18–25		26–35		36–45		46–55		over 55		Total	
Department	C*	%	C	%	C	%	C	%	C	%	C	%
Mines	153	21.4	268	37.5	178	24.9	90	12.6	25	3.5	714	29.5
Mills	116	24.2	191	39.9	115	24.1	45	9.4	11	2.3	478	19.8
Furnace	70	28.9	74	30.5	43	17.7	38	15.7	17	7.0	242	10.0
Maintenance	34	15.8	65	30.0	50	23.2	46	21.4	20	9.3	215	8.8
Yard	82	46.8	51	28.7	24	13.5	11	6.2	9	5.0	177	7.3
Transportation	10	5.7	42	24.4	49	28.4	47	27.3	24	13.9	172	7.1
Open hearth	45	27.6	48	29.4	36	22.1	22	13.5	12	7.5	163	6.8
All others	74	28.5	89	30.5	54	18.6	24	8.4	18	6.9	259	10.8
Total	584	24.1	828	34.2	549	22.7	323	13.3	136	5.7	2420	100.0

* C—actual cases.

TABLE IV.

	Recorded Period of Absenteeism											
	1 day		more 1 less 3		3 to 8 days		8 to 31 days		over 31 days		Total	
Causes of Lost Time	C*	%	C	%	C	%	C	%	C	%	C	%
Upper Respiratory Infections	31	3.3	62	6.5	399	42.3	399	42.3	51	5.4	942	38.9
Oto-rhino-laryngologic and eye cond.	19	7.0	21	7.8	161	59.4	65	23.9	5	1.8	271	11.2
Gastro-Intestinal Complaints	90	34.6	49	18.8	72	27.6	37	14.2	12	3.6	260	10.7
Locomotor Neuromusc. Complaints	21	11.6	20	11.0	66	36.4	58	32.1	16	8.8	181	7.5
Non-Occupational Injuries	16	9.4	6	3.5	55	32.1	81	47.3	13	7.6	171	7.1
Genito-Urinary Complaints	4	3.1	7	5.4	35	26.9	63	48.4	21	16.1	130	5.4
Non-Specific Infections	1	0.8	6	5.1	31	26.7	59	50.8	19	16.3	116	4.8
All other	58	16.6	35	10.0	85	24.3	101	28.9	70	20.1	349	14.4
Total	240	9.9	206	8.5	904	37.5	863	35.6	207	8.5	2420	100.0

* C—actual cases.

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*This study was interrupted by active military duty and was completed after discharge from service.

TABLE V.

Causes of Lost Time	Age Group Distribution 18–25 C*	%	26–35 C	%	36–45 C	%	46–55 C	%	over 55 C	%	Total C	%
Upper Respiratory Infections	200	21.2	309	32.8	233	24.7	143	15.1	57	6.1	942	38.9
Oto-rhino laryngologic and eye cond.	94	34.8	118	43.5	38	14.0	18	6.6	3	1.1	271	11.2
Gastro-Intestinal Complaints	54	20.8	99	38.0	68	26.1	25	9.6	14	5.4	260	10.7
Locomotor Neuromusc. Complaints	20	10.8	51	28.2	54	29.8	35	19.3	21	11.5	181	7.5
Non-Occupational Injuries	34	19.3	70	40.8	35	19.3	26	15.2	6	3.5	171	7.1
Genito-Urinary Complaints	53	40.7	40	30.7	22	16.9	10	7.6	5	3.8	130	5.4
Non-Specific Infections	41	35.3	37	31.0	24	20.1	9	7.7	5	4.2	116	4.8
All other	88	25.2	104	29.8	75	21.5	57	16.3	25	7.1	349	14.4
Total	584	24.1	828	34.2	549	22.7	323	13.3	136	5.7	2420	100.0

* C—actual cases.

TABLE VI.

Causes of Lost Time	Mines C*	%	Mills C	%	Furnace C	%	Maintenance C	%	Yard C	%	Transportation C	%	Open hearth C	%	All other C	%	Total C	%
Upper Respiratory Infections	257	27.2	212	22.5	100	10.6	92	9.7	51	5.4	67	7.1	61	6.5	102	10.8	942	38.9
Oto-rhino Laryngolog. and eye cond.	65	23.9	56	20.7	19	7.0	28	10.3	24	8.9	17	6.2	16	5.9	46	16.9	271	11.2
Gastro-Intestinal Complaints	63	24.2	59	22.7	32	12.3	18	6.9	17	6.5	19	7.3	20	7.7	32	12.3	260	10.7
Locomotor Neuromusc. Complaints	58	32.0	23	12.7	19	10.5	27	14.9	13	7.2	16	8.8	13	7.2	18	9.9	181	7.5
Non-Occupational Injuries	50	29.2	36	20.4	12	7.0	15	8.7	17	9.3	19	11.1	12	7.0	10	5.8	171	7.1
Genito-Urinary Complaints	61	46.9	13	10.0	16	12.3	3	2.3	14	10.7	9	6.9	6	4.6	8	6.1	130	5.4
Non-Specific Infections	39	33.6	16	13.8	14	11.1	8	6.8	15	12.8	3	2.5	11	9.4	10	8.6	116	4.8
All other	121	34.6	63	18.1	30	8.6	24	6.9	26	7.5	22	6.3	24	6.9	33	9.4	349	14.4
Total	714	29.5	478	19.7	242	10.0	215	8.8	177	7 3	172	7.1	163	6.8	259	10.8	2420	100.0

The survey has been divided into what we think are the four logical and convenient headings. (1) Incidence of time lost for all employees according to age distribution (Table I). (2) Incidence of time lost by all employees according to departments (Table II). To this we have added a second table covering the age group distribution of the employees in the various departments studied (Table III). (3) Incidence of time lost according to illness for all employees (Table IV). Here again we added a secondary table showing the age groups as represented by the various illnesses encountered (Table V). (4) Incidence of non-occupational illness by departments (Table VI). It is to be emphasized that these figures and percentages do not represent total days lost per year per employee, but rather the actual recorded time lost from inception of illness, when first seen by the doctor, to the date of return to work, for each separate period of disability claimed by the employee. By this method a single employee may show more than one period of lost time per year.

During our preliminary tabulations it was found that many of the complaints occurred rather infrequently in the entire series. Therefore, to avoid confusion, we have grouped together closely related disease conditions into single categories. For example, conditions such as neuritis, lumbago, sciatica, gout, arthritis, rheumatism, myositis, etc., have been classified as disease of the locomotor and neuromuscular systems. Similarly, we have placed in one classification several related departments. Carpenters, guards, electricians, brickmasons, plumbers, painters, firemen, watchmen, etc., have been grouped as maintenance department. It should be mentioned here that this study covered only one of the many plants of the organization and, therefore, as the individual employees per department represented was too small for separate classification, this procedure was taken. On the whole, our figures represent only approximately one-tenth of the total employees, but are a representative sample for study.

It has been claimed by students of this phase of industrial medicine that the average loss of time per employee per year due to illness is seven days. Some national data based on all age groups and industries show that chronic disease including permanent disability accounts for six of the estimated 10 days incapacity from illness and accident experienced by the average working person per year. More recently Selby[7] quotes a survey conducted by the Division of Industrial Hygiene, National Institute of Health, which reports that about 10% of the employees studied were losing about 40 days per year. Sappington[8] on the other hand, in his study which antedated all the others, found that approximately 60% of all absenteeism occurred in the one, two and three day groups.

It is interesting to compare these reported figures with those actually found in our own study.

Of the entire group of records studied for the period, 37.5% (904 cases) were absent from work for three to eight days per year for a single non-occupational illness, and 35.6% (863 cases) lost from eight to 31 days. Both of these groups together accounted for 73.1% of the cases of lost time of non-occupational origin. Only 18.4% (446 cases) lost less than 72 hours per illness per year and 8.5% (207 cases) lost over 31 days per year. This is at variance with the report of Sappington[9] who demonstrated in his study that approximately 54.9% of absenteeism occurred in the one and two day groups (Table I).

The age group distribution as a whole revealed several interesting facts: 56.8% (1377 cases) of the employees who had absentee records were between 26 and 45 years of age, the period of greatest activity and productivity. Between the ages of 18 and 35 there was an incidence of absenteeism of 58.3% (1412 cases). Splitting these figures down further, we find that among the employees 25 years of age or less there was a total absentee incidence of 24.1% (584 cases). Employees from 26 to 35 years of age showed an incidence of 34.2% (828 cases); those from 36 to 45 years of age had an incidence of 22.7% (549 cases); from 46 to 55 years of age there was a still lower incidence of 13.3% (323 cases) and lastly, those 55 or over had the lowest incidence recorded, or 5.7% (136 cases). The actual percentage incidence of lost time in the individual age groups as found in Table I was generally higher inversely with the age in the one-day

to three-to-eight-day groups up to the age of 55. At this age, the percentage ratio changes proportionately to an increasing period of disability corresponding with the age of the employee. We believe that this indicates a definite need for geriatrics in the practice of industrial medicine.

Considering at this time the incidence of lost time by departments, we found that actually 89.2% (2161 cases) of the employees studied were to be found in one of seven major departments. Just what factors are at play to explain this predominance of lost time in these seven departments remains to be determined. On the other hand, this may be due simply to the fact that more men are employed in these departments than elsewhere.

Of the entire 89.2% of the employees in these departments, 32.6% (785 cases) had absentee records showing a period of lost time of from three to eight days; while 32.3% (784 cases) showed a period of lost time of from eight to 31 days during the time of this study. Seventy-two hours or less were lost by 16.3% (392 cases), while 8.0% (200 cases) were absent from work for more than 31 days per year per illness. Total departmental representation was 29.5% (714 cases) in the mines; 19.8% (478 cases) in the mills; 10.0% (242 cases) in the furnaces; 7.3% (177 cases) in the yard; 8.8% (215 cases) in the maintenance department; 7.1% (172 cases) in the transportation division; 6.7% (163 cases) in the open hearth section. The remainder of the employees studied were variously distributed in the smaller ramifications of the plant.

In the 10.8% (259 cases) minority group the lost time was similarly distributed: 20.7% (54 cases) lost less than 72 hours per year per illness recorded; 45.9% (119 cases) lost from three to eight days; 30.5% (79 cases) lost from eight to 31 days per year and 2.7% (7 cases) lost over 31 days per year.

This study by departments confirmed our previous findings that most employees were incapacitated by illness for a period of three to eight days per year for each recorded absence. This interval of time was in no way affected by the type of work done by the individual, with the possible exception of those working in the mines.

Turning now to a consideration of the age distribution of the employees in the various departments studied we found that 23.6% (510 cases) of the employees 18 to 25 years of age were working in one of the seven major departments mentioned previously (Table III). The separate percentages vary in this age group from 5.7% in the transportation section to 46.8% in the yard. The over-all percentage in this age group was 24.1% (584 cases) for the entire employee population studied. Of the employees in these seven major departments, 34.8% (739 cases) were between 26 and 35 years of age, with the majority of 39.9% employed in the mills. This group of 828 cases represented 34.2% of all the employees. Between the ages of 36 and 45, 22.9% (495 cases) were employed in these same departments, with 13.5% in the yard and 28.4% on the transportation line. The over-all percentage represented here was 22.7% (549 cases) of the entire series. Of the employees 46 to 55 years of age 13.8% (299 cases) were similarly placed, with 6.2% working in the yard and 27.3% in the transportation division. Of the entire series, 13.3% (323 cases) were in this age grouping: 5.4% (118 cases) were 55 years of age or over, with 2.3% of this age group working in the mills and 13.9% on the transportation line. Of all the employees 5.7% (136 cases) were 55 years of age or over.

In this respect, it is of interest to note that in those departments requiring more skilled labor, quick thinking and alertness, we find the younger more active and energetic employee. The mean age for all employees in all departments studied was between 26 and 35 years of age, 34.2%, but in some of the departments the number of employees varied. For example, whereas 37.5% of the miners were between 26 and 35 years of age, only 24.4% of those in the transportation department were of this age grouping.

Selby[10] has stated that 25% of the time of the industrial employee, or the exposure resulting from his occupation, account for 6% of his annual disablement, due to injury or disease of a direct occupational type. It can be implied, then, that the remaining 94% of the lost time is caused by conditions which are outside of the industrial organization. This definitely shows that the main problem of absenteeism, its causes, effects and prevention are identical to those common to the general population as found outside industry.

Non-industrial accident and sickness, although up to now not recognized primarily as the responsibility of the employer, are nevertheless the main cause of the greatest losses both to the employers and the employees. From the various outstanding reports in the literature it has been determined that sickness has accounted for almost 92.1% of all classes of absenteeism, while industrial accidents *per se* and non-industrial accidents accounted for 4.9 and 3.0% respectively. On the basis of frequency, it is the so-called minor illnesses which caused the greatest number of cases of absenteeism.[11]

REALIZING what the common causes of non-industrial absenteeism have been at other large industrial organizations where similar studies have been made, it was decided to determine for ourselves what the leading causes of lost time had been during the two year period of this study. Table IV shows the causes of lost time with the duration of absenteeism for recorded illness, and Table V shows the causes of lost time by age groups.

Our main cause of lost time was found to be disease of the upper respiratory tract, in all forms and types. Of the recorded absences 38.9% (942 cases) had disease of the upper respiratory system of such severity as to require lost time from work. Of these, 84.6% (798 cases) of the entire employees surveyed were absent from work from three to 31 days per illness per year. A further breakdown of these figures shows that 42.3% (399 cases) were ill and off from work for three to eight and eight to 31 days respectively; 9.8% (93 cases) were sufficiently mild to require 72 hours or less for complete recovery and return to work, while 5.4% (51 cases) were of sufficient severity to incapacitate the employee for more than 31 days per illness. It is an interesting sidelight to call attention here to the fact that 53.2% of all upper respiratory infections occurred in the white employee population whereas 46.8% of the same conditions occurred in the negroes.

Hay-fever, pharyngitis, tonsillitis and related oto-rhino-laryngological conditions with associated disease of the eyes and head accounted for 11.2% (271 cases) of the causes of lost time in our employees. A total of 83.3% (226 cases) of these cases were absent from work for three to 31 days per year per illness; 59.4% (161 cases) were absent from work for a period lasting from three to eight days; 23.9% (65 cases) had recorded absences of eight to 31 days per year; 14.8% (40 cases) lost less than 72 hours, and 1.8% absented themselves from work for a period of 31 days or more. Of these disabilities 51.3% occurred in the negroes.

Digestive complaints of all types, severity and complexity, excluding operative cases, constituted the third most frequent cause of lost time in the employees studied. These complaints occurred in 10.7% (260 cases) of the employees: 53.4% (139 cases) lost 72 hours or less; 27.6% (72 cases) were absent from work for three to eight days for each illness recorded; 14.2% (37 cases) lost from eight to 31 days, and only 3.6% (12 cases) had recorded absences of over 31 days per illness. We notice, here too, a slight predominance of incidence in the negro population with 51.5% occurring in that race and 48.5% in the whites.

Rheumatism, arthritis, myositis, and other related locomotor articular dysfunctions accounted for 7.5% (181 cases) of the cases of lost time in this series. One hundred twenty-four cases (68.5%) were absent from work for a period of three to 31 days per year; of these 36.4% (66 cases) actually losing from three to eight days per year, and 32.1% (58 cases) losing from eight to 31 days per year. Forty-one cases (22.6%) had absentee records of 72 hours or less, and 8.8% (16 cases) similar records extending over 31 days per year. The incidence in the negro employees in this division was 63.0% against 37.0% in the white employees.

The incidence of non-occupational injuries and accidents was relatively low in the entire series with only 7.1% (171 cases) recorded absences due to this factor. As a result of such injuries and accidents 79.4% (136 cases) of the employees lost from three to 31 days per year per injury or accident; 47.3% (81 cases) lost from eight to 31 days, and 32.1% (55 cases) lost from three to eight days for the same reason. Only 12.9% (22 cases) of these accidents caused a disability of 72 hours or less, and 7.6% (13 cases) a disability of over 31 days duration. We found that 71.9% of all non-industrial injuries and accidents occurred in the negro employees, while only 28.1% occurred in the white employees.

Genito-urinary complaints occurred in only 5.4% (130 cases) of the employees studied. As to duration of time lost, 75.3% (98 cases) absented themselves from work for three to 31 days per year per illness. Of these, 26.9% (35 cases) lost from three to eight days per illness and 48.4% (63 cases) lost from eight to 31 days per illness. Eleven cases (8.5%) lost less than 72 hours, and 16.1% (21 cases) lost over 31 days per illness. Included in this classification were cases of primary and secondary lues and acute gonorrhea, which, by order of the medical department, were excluded from work until all signs of infectiousness had disappeared. This factor may have some bearing on the high incidence of prolonged recovery time in the cases of genito-urinary disease. On the basis of racial distribution we found that 15.4% occurred in the white employees and 84.6% in the negroes.

One hundred sixteen (4.8%) of the cases of lost time were due to non-specific infections such as erysipelas, furunculosis, cellulitis, etc. In this group we found a marked prolongation of recovery time with 77.5% (90 cases) requiring three to 31 days for return to duty; 26.7% (31 cases) required three to eight days, and 50.8% (59 cases) required eight to 31 days for complete recovery and return to work. Seven cases (5.9%) were of such character to require 72 hours or less for recovery, and 16.3% (19 cases) required over 31 days for return to work. Of our non-specific infections 70.8% occurred in the negro employees and 29.2% in the white employees.

All other causes and disabilities accounted for 14.4% (349 cases) of our recorded cases of lost time. Of these 53.2% (186 cases) lost from three to 31 days per disability; 26.6% (93 cases) lost 72 hours or less, and 20.1% (70 cases) lost over 31 days per year per illness. Of these disabilities 60.1% occurred in the negro employees and 39.9% in the white employees.

We wish to call attention at this time to the predominance of disabilities in the negro employees, particularly in all cases except upper respiratory infections. Of all the employees studied 55.9% were negroes and 44.1% were white. This small variation in incidence of races is not sufficient to account for the marked predominance of disabilities in the colored employees. Just what factors are at play to account for this variation are yet to be determined, but we think that they rest in environmental, economic and social background of the southern negro.

TABLE V shows the age group distribution for the various disease entities causing lost time in our survey.

Of the cases of upper respiratory infection 21.2% (200 cases) occurred in employees 18 to 25 years of age. The incidence in the corresponding age groups was 32.8% (309 cases) in the employees 26 to 35 years of age; 24.7% (233 cases) in the employees 36 to 45 years of age; 15.1% (143 cases) in the employees 46 to 55 years of age; and 6.1% (57 cases) in the employees over 55 years of age.

Oto-rhino-laryngological disease with associated disease of the eyes was found in 34.8% (94 cases) of the employees 18 to 25 years of age; 43.5% (118 cases) were to be found in the employees 26 to 35 years of age; 14.0% (38 cases) in workers 36 to 45 years of age; 6.6% (18 cases) in those 46 to 55 years of age; and 1.1% (3 cases) in employees 55 years of age or over.

Gastro-intestinal complaints were to be found in 20.8% (54 cases) of the employees 18 to 25 years of age; 38.0% (99 cases) occurred in employees 26 to 35 years of age; 26.1% (68 cases) in those from 36 to 45 years of age; 9.6% (25 cases) in employees 46 to 55 years of age; and 5.4% (14 cases) in the employees over 55 years of age.

Locomotor and neuromuscular complaints were to be found in 10.5% (20 cases) of the employees under 25 years of age; 28.2% (51 cases) of the employees 26 to 35 years of age had absentee records as a result of such disorders; 29.8% (54 cases) of those 36 to 45 years of age; 19.3% (35 cases) of those 46 to 55, and 11.5% (21 cases) of the employees over 55 years of age had similar disabilities.

Non-occupational injuries and accidents occurred in 19.3% (34 cases) of the cases 18 to 25 years of age; 4.8% (70 cases) were to be found in the employees 26 to 35 years of age; 19.3% (35 cases) in those 36 to 45 years of age; 15.2% (26 cases) in those 46 to 55 years of age; and 3.5% (6 cases) in the employees over 55 years of age.

Genito-urinary complaints occurred in 40.7% (53 cases) of the employees under 25 years of age; 30.7% (40 cases) occurred in the 26 to 35 year grouping; 16.9% (22 cases) in the employees 36 to 45 years of age; 7.6% (10 cases) in those 46 to 55 years of age, and 3.8% (5 cases) in those employees over 55 years of age.

Non-specific infections occurred in 35.3% (41 cases) of those in the 18 to 25 age group; 31.0% (37 cases) of the 26 to 35 age group; 20.1% (24 cases) of the 36 to 45 age group; 7.7% (9 cases) of the 46 to 55 age group; and 4.2% (5 cases) of the over 55 age group.

It is interesting to note the prominence of upper respiratory infections, gastro-intestinal complaints, locomotor and neuromuscular disease and non-occupational injuries in the 26 to 45 age groups, while oto-rhino-laryngological conditions, genito-urinary disease and non-specific infections predominated in the 18 to 26 age groups.

It has been shown that the character of an employee's occupation has no direct bearing on the duration of the time lost by that individual because of non-occupational illness. Wells[12] has recently shown that two important factors which increase infection in man are atmospheric density and temperature. His work is in accordance with that of Kerr[13] who disclosed that colds were contracted because of the inability of the body to adjust itself to radical and sudden changed conditions. On the basis of these reports we were led to think that the occupation of the individual must bear some burden of responsibility for certain diseases developing in said employees.

In order to confirm or refute our personal theory we tabulated the causes of lost time among the employees according to department, Table VI. Although our series was not sufficiently large from which to draw definite dogmatic conclusions, the results obtained clearly indicated that there was absolutely no correlation between these facts, with the possible exception of those working in the mines, mills or furnaces.

As noted previously, the majority of cases of absenteeism were recorded in seven major departments. It is in these same departments where sudden changes of temperature, humidity, atmospheric density, etc., were most common. Naturally, this factor would produce a marked predominance of upper respiratory infections, as indicated by the work of Kerr. This, too, is in accord with the work of Neal,[14] who, in a recent survey covering 15 states and nearly 1½ million employees, found that respiratory disease caused 44% of the disabilities. Excluding those cases of upper respiratory infection and non-occupational accidents we found that there was almost an equal distribution in the departments studied of all forms and causes of disability.

Summary

IN THIS study of 2,420 cases of lost time in industry, we found that the duration of absenteeism per employee per year per illness was three to eight days, with a period lasting from eight to 31 days occurring almost as frequently. Of those employees with recorded absentee records 58.3% were under 35 years of age. And of the employees studied 55.9% were negroes and 44.1 per cent were white.

Most of the cases of lost time were to be found in seven major departments, namely, mines, mills, open hearth, yard, transportation, maintenance and blast furnaces, where the employee was most apt to be subjected to sudden and radical changes in atmospheric conditions. This fact we believe to be responsible for the high incidence of upper respiratory infections encountered. Non-occupational accidents and injury accounted for only 7.1% of the cases of lost time in our plants. With the exception of upper respiratory infections, the other complaints predominated in the negro employees in all departments.

There is no definite relationship shown between occupational exposure, environment, etc., and the onset of a non-occupational illness. Similarly, there could not be demonstrated any relationship between occupational exposure and the duration of absenteeism.

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Industrial Medicine

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OCCUPATIONAL injuries and diseases account for less than 7% of the total time lost from work because of physical ailments. We will not dwell upon that phase of industrial medicine, but rather upon the great bulk of physical ills that plague humanity outside of industry's door, yet account for 94% of the lost time.

We have with us a group of physicians, each of whom has served at least five or more different General Motors employees within the past year. Survey of our physician's file, containing various medical certificates and notes, discloses that more than 270 Baltimore physicians come within that category. I think sometimes of you as the civilian "G. I. Joes" of medicine, and miss the presence of many who are serving in the armed forces. We also have with us those engaged in the many phases of public health, whose cooperative work with you and with industry has added much to the health and safety of your patients. I welcome this opportunity to acknowledge with thanks

This is the text of DR. FULTON'S remarks at a meeting of General Motors Club, Baltimore, March 21. General Motors Club, of Baltimore, representing the various G.M. activities, "meet together once a month with the purpose of better understanding each other, our jobs, and the plans and objectives of the institution of General Motors." On March 21, the club was host to the medical profession of Baltimore. In addition to the special guests (INDUSTRIAL MEDICINE, April, 1945, p. 20), there were local guests to the number of nearly 300. The following is from the *Baltimore Evening Sun*, March 22: "M. H. BODEN, president, opened the dinner-meeting. DR. W. J. FULTON, medical director of Eastern Aircraft and Chevrolet Baltimore Division, spoke on the cooperation which was hoped for by the practicing physician. He emphasized the idea that the physician attached to the industrial plant would not infringe on the work of the practitioner and said that only cooperation between the two classes of physicians would achieve the results sought. DR. J. F. JOHNSON, medical director of the Eastern Aircraft Linden Division, showed a motion picture which illustrated how samples of air in factories are taken, the measures to eliminate carbon monoxide gas and other gases, and how skin diseases are prevented by protective appliances worn by workers. M. J. MCCARTHY, safety director of Fisher Body, Detroit, said Adolph Hitler expected the war to be won by the German scientists and technicians. The war would not be won by the German scientists, he declared, but by American enterprise and scientific knowledge. DR. C. D. SELBY, medical consultant of General Motors Corporation, delivered an address in which he spoke of the marvels accomplished by the medical profession in the past and prophesied greater accomplishments for it in the future. He asked for greater confidence in the profession."

Left to Right: Dr. C. D. Selby; Dr. J. G. Townsend; Capt. W. D. Allers, M.C.; Mr. G. W. Keller (General Motors Club); Dr. B. M. Jaffe; Dr. A. J. Blechman; Dr. J. Sindler

Left to Right: Dr. Coral Gordon; Mr. M. H. Boden (President, General Motors Club); Mr. H. Holmes; Dr. J. F. Johnson; Mrs. J. F. Johnson; Miss Yvonne DuBois, R.N.

your important and valuable contributions. It is nice to acknowledge what you have done for industry, and also nice for industry to state what it is doing for you. However, I believe it even nicer to speak briefly about that which all of us, as a team, are doing for each other with the single common purpose of improving the health and safety of the community. The offices of all three of these branches of medicine, along with their ally, the nursing profession, are so closely intertwined that it would be quite impossible to discuss any specific one. We can only touch upon a few of our many relationships.

FIRST—what is the policy of the Baltimore General Motors Medical Department? The profession is aware of the first principle of medicine, namely, the welfare of the patient. With this goes the close personal and confidential relationship. The code of ethics guiding the intra-professional relationship is well known to all of us. The mere fact that a physician is engaged by industry, or for that matter by any other agency, grants him no license to depart one iota from these fundamentals. The Baltimore medical staff consistently pursues these fundamentals, as a policy, to the best of its ability. As to the policies of General Motors in this regard, I am not aware that any exist. In my 10 years' association with the corporation, I have seen no evidence that would shake my conviction that whatever policy it may have conforms to those general principles. In addition, the corporation grants freedom to each of its numerous medical directors to exercise his own initiative in the furtherance of his profession's services. Encouragement is lent to research that will not only make for the betterment of industrial health, but also for betterment of community and national health. We are expected to assume the obligation of good citizenship. While a central industrial hygiene laboratory is at our disposal, the creation of a self-sufficient industrial medical service in each General Motors unit is an ultimate goal. He who believes that industrial medicine stops at the factory door is aware of only a very small portion of its functions and potentialities.

The relation of industrial medicine to private practice begins at the moment of the pre-employment physical examination. The first step is physical appraisal for the purpose of safe placement. It is conservative to state that at least 1000 correctible physical conditions were picked up in 1944 and referred to the family physician. "But," says an employee, "I have no family physician," or "He is in the Army." In all such instances we refer the case to the physician handling the practice of the one in the armed forces, or furnish to the employee the names of a number of general practitioners located in his immediate neighborhood. Of 35,000 purely personal physical complaints that brought employees to our plant hospital during working hours in 1944, 800 had symptoms sufficiently acute to warrant their immediate transportation to a hospital, to the office of their physician, or to their homes. The conditions varied from acute surgical emergencies to moderately disabling upper respiratory infections. It is again conservative to state that the advice to see the family physician was given in 3000 additional instances. Protection to other employees has been afforded through detection of some communicable conditions. More than 13,000 absenteeisms due to physical disability have cleared through the hospital in the past year. Many bring your certification of diagnosis and your recommendation as to their temporary care and placement. It is our policy to back up your recommendations when no impractical precedent is involved. Supervision shows every willingness to cooperate.

Here I should like to mention a matter that is timely and of growing importance, namely, the rehabilitation of our returning wounded. No branch of medicine working alone can succeed in solving the many problems involved, but industrial medicine will, with confidence, call upon and cooperate with the other medical and lay agencies who are making a concerted effort in our veterans' behalf.

Because of the tremendous number of personal contacts, the industrial physician finds himself much in the position of an ambassador between numerous patients and the general profession. He hears you extolled and excoriated. I know of no branch of the medical profession in a better position to create good or bad personal relations. The industrial physician must be continually on his guard.

A consistent health maintenance program is in operation. We take the view that rapid mass x-ray and serological surveys will not pay as high dividends in long term preventive medicine and public health as a consistent and oft-repeated turnover of personnel, complemented by a thorough follow-up of positive

cases. Too often mass surveys are made without adequate follow-up, only to be statistically appraised and then forgotten. The recent high rate of labor turnover has injected into such hurried mass surveys an equally high rate in wastage of valuable medical time and material. We are entering our third year and are turning up the evidence that findings that were negative in an individual two years ago are positive now. Cured and arrested cases are beginning to return. I pay tribute to the splendid aid we have had from our public health departments and sanatoriums in executing this program. Let me add that every positive case has been placed in the hands of the private physician. This work has entailed direct communication with practically every one of you through spoken or written word. All of this most certainly affects public health. I pause to point out that industrial medicine, living continuously with a cross-section of the population and taking advantage of its opportunity to record and convey its experience, affords a vast potential for public health research and discovery. *For example, less than two weeks ago a headline appeared on the front page of the Sun-papers reporting the discovery of what was termed a "health barometer" in the British Isles. The determinations were apparently based on the coordination of information obtained by numerous personal interviews with British subjects of varying social strata.

It is my conviction that coordinated industrial medical reporting in this nation of the information that parades every day and hour through the factory hospital doors is capable of creating here a weather bureau of national health that will likewise make the front page headlines.

As to those conditions deemed to be occupational by private practitioners, let me say this: Industrial medicine has nothing to hide from its patients. We offer every cooperation toward helping you prove your case.

This policy will only aid in control and prevention. I would caution, however, against a diagnosis based primarily on the description by the patient of work, environment and materials. We will be glad to give the actual facts to you.

Now for a subject that has been a problem to all of us. The relation of the physician to his patient has never changed and, barring some political control and regimentation of the profession which, in my opinion, would destroy that close personal and confidential relationship, I do not believe that it ever will change. The same stability of attitude on the part of the patient toward his physician, however, does not always exist. The six or seven day week, with other war time exigencies, has influenced this. The history given by the patient, as we know, is an important factor in a diagnosis. Of long habit, the physician relies on the honesty of his patient. The majority of your patients are honest, particularly those whom you have known for a long time. There are those, however, who would use sickness as an excuse for absenteeism when it is not the cause. Beware of certifying that so and so has been under your care for some illness over the past two weeks when today is the first time you have seen him. There are also those who would use certified physical ailments as a means to fulfill purely personal desires. Beware of recommending "day shift only," a "transfer to another operation because of the detrimental effect of the present operation upon her health," or a "two weeks' rest because the patient has a condition of emotional instability caused by his work." I admit that there are occasional warranted cases. But I find by experience that in the vast majority of this type of instance the name of the certifying physician appears for the first time on the record of this patient (and we do keep records), while the record previous to this will show the names of from two to five different physicians who have attended this employee over the past one or two years. Frankly, I wish to compliment you on the way you have met this problem in the past, and to state that there is evidence in your certificates that you are becoming more aware of it. Recently we have noted an increase in such phrases as this: "the patient states that he has been incapacitated because of a bronchitis for two weeks. I have examined him today and certify that he is physically able to return to work," or this: "the patient states that he has certain symptoms due to the stress of his work. At *his* suggestion, I advise a two weeks' rest." We give thanks for this trend. It will help curb that 20% of the industrial population that is habitually responsible for 70% of the unwarranted individual absenteeism and for almost 100% of the hue and cry raised against it. It will also greatly aid justice in the handling of personnel problems.

In all cases where *your* certified recommendations enter into the making of a decision by the industrial medical department, it is our practice to forward to you a copy of the decision, including our basic reasons. It is safe to say that at least 50% of personnel problems and their solution involve the medical profession or the industrial medical department.

I believe you will agree that already enough evidence has been presented to indicate that industrial medicine is not engaged in cure and treatment. In fact, 80% of its value lies in organizing and administering practical applied prevention. I can see no justifiable reason why it should compete with private practice. It deals with the so-called "well" not just the "sick"—and for this reason is an incipient and unsuspected case finding agency second to none.

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*Here DR. FULTON referred to a *Reuter's* dispatch, London, in *Baltimore Evening Sun*, March 6, as follows:

"Long-range zonal forecasting of health in Britain is now possible, and the Ministry of Health, taking full advantage of an amazingly accurate 'health barometer,' is able to utilize its full anti-disease measures to prevent national ill-health instead of having to cure it. The 45 people who made the 'health barometer' possible are women statistics sleuths attached to the Wartime Social Survey, 'brain child' of the Ministry of Information. Giving first details of this unique service, Dr. S. J. L. Taylor, director of home intelligence for the Ministry of Information, and joint chief, with Leonard Moss, research expert of Wartime Social Survey, said the barometer was specially devised for the Ministry of Health. 'We made an initial survey to find out exactly what illnesses were afflicting the people of Great Britain,' he said. The only statistics the Ministry had at the time were the number of deaths in the country. 'Our survey gave a full picture of the nation's ill health. We continued it every month and found that many ailments and epidemics came in cycles. Before long, we were able to predict not only the ailments, but the areas in which they were likely to occur. Naturally the health barometer enabled the Ministry of Health to take preventive measures rather than curative action.' The Wartime Social Survey tackles its tasks this way: Squads of investigators are sent to various parts of the country armed with specially prepared questionnaires 'vetted' by a tryout on 60 'guinea pigs'—a cross section of the British public. For the mass quiz the investigators take an equal number of people—poor, middle class and rich, young, middle-aged and old, slum dwellers, suburban residents and mansion occupiers—and record their answers to the identical questionnaire."

American Association of Industrial Physicians and Surgeons

By-Laws—Proposed for Adoption

Article I—Membership

SECTION 1. Membership in this Association shall be of four classes: (a) Fellow; (b) Active; (c) Associate; and (d) Honorary.

SECTION 2. Fellow Membership. Fellows shall be elected from persons who have been Active and/or Associate Members for at least five (5) consecutive years prior to their election as Fellows.

SECTION 3. Active Membership. Active Members shall be persons who are in good standing in the American Medical Association through the respective local county medical societies, or, where the applicant resides in a foreign country, of some corresponding association or society, and who shall have had at least five (5) years' experience in the practice of medicine or surgery since graduation from internship, at least three (3) of which must have been in the field of Industrial Medicine and Surgery, during which three-year period, 50% of his practice must have been in that specialty, provided that a person with exceptional qualifications and experience, even though less than 50% of his practice is industrial, may become an Active Member.

SECTION 4. Associate Membership. Associate Members shall be persons who have the personal and professional qualifications for active membership but whose length of experience in the practice of medicine or surgery or whose percentage of industrial practice is insufficient for such membership.

SECTION 5. Honorary Membership. Honorary membership may be conferred upon physicians and surgeons who have contributed distinguished service to the objectives for which the Association stands or who have performed some special service for the Association.

SECTION 6. Associate and Honorary Members shall have all the privileges of Fellows and Active Members, except the privileges of holding office and voting for officers or directors or for amendments to the Certificate of Incorporation or the By-Laws.

SECTION 7. Application for active or associate membership must be made in writing, be accompanied by the fee for the annual dues for the year in which the application is accepted and the applicant must be certified by the Secretary of the applicant's local County Medical Society as a member in good standing thereof, or in case the applicant resides in a foreign country, some corresponding Association or Society. Application must be approved by

(a) a Fellow or Active Member in good standing; and

(b) the component Society in the locality in which applicant resides, if there be a component Society in such locality and

(c) a majority of the Membership Committee, provided however, that

(1) in case of a dispute over any refusal to approve by a Component Society, such applicant has the right of appeal to the Board of Directors of the Association and such approval may be waived after such appeal upon a vote of the majority of the whole Board expressed in meeting, or in writing and

(2) when the Board of Directors determines that the jurisdiction of any Component Society over an applicant is doubtful, such approval of a Component Society shall not be required.

After approval, as aforesaid, the application of such member may be accepted at a meeting of the Board of Directors at which a quorum is present by the favorable vote of two-thirds of the Directors present at such meeting.

Fellows and Honorary members require no prior approval, but may be elected from time to time by a meeting of the Board of Directors at which a quorum is present, by the favorable vote of two-thirds of the members present at such meeting.

Article II—Officers and Directors

SECTION 1. The Directors of the Association shall consist of the officers, other than Assistant Secretaries, that Past President who was last installed in such office, and twelve other persons.

SECTION 2. The officers of the Association shall be a President, a President Elect, a First Vice-President, a Second Vice-President, a Secretary, a Treasurer, a Managing Director, and any number of Assistant Secretaries as may from time to time be appointed by the Board of Directors. The President shall hold no other office. Otherwise the same person may hold more than one office.

SECTION 3. Only Fellows shall be eligible to serve on the Board of Directors or as officers. Only Active Members and Fellows may vote for officers or Directors.

SECTION 4. Any officer or Director may resign at any time, such resignation to be in writing and to take effect upon its receipt by the Association, unless a certain time be fixed in the resignation, and in such case, at the time therein fixed. The acceptance of a resignation shall not be required to make it effective.

Article III—Duties of Officers

SECTION 1. The President shall be the chief executive officer of the Association and, subject to the jurisdiction of the Board of Directors, have general administrative control of its affairs. He shall preside at all meetings of the Members and of the Board of Directors, and perform such other duties as from time to time may be directed by the Board of Directors. He shall be *ex-officio* a member of all committees. He shall have general power to execute bonds, deeds, and contracts in the name of the Association and shall have such other duties as may be conferred upon him by law, these By-Laws, or by the Board of Directors.

SECTION 2. The President Elect shall preside at all meetings of the Members and of the Board of Directors when the President is not present.

SECTION 3. Each Vice-President shall have such power as shall from time to time be conferred upon him by the Board of Directors. In the absence at any meeting of the Members or of the Board of Directors of both the President and the President Elect, the First Vice-President, if present, shall preside, and if he be not present, the Second Vice-President shall preside.

SECTION 4. The Secretary shall keep an accurate record of all the transactions of all meetings of the Association and of the Board of Directors and shall keep a correct list of all Members of the Association and their addresses. He shall be responsible for sending all notices of meetings. He shall be in charge of the Association's seal.

SECTION 5. The Managing Director shall carry on the correspondence of the Association; shall receive all moneys belonging to the Association, giving receipt therefor, and turning them over to the custody of the Treasurer. He shall be paid a yearly salary, the amount to be determined by the Board of Directors. He shall be bonded.

SECTION 6. The Treasurer shall be the custodian of all moneys of the Association and shall pay all just bills against the Association subject to the approval of the Board of Directors; he shall submit his accounts audited by a Certified Public Accountant, to the Board of Directors at the Annual Meeting and shall transmit to his successor in office all funds and property of the Association remaining in his possession. He shall submit an annual report to the Association in such form as may be determined by the Board of Directors. He may be bonded in such an amount as shall be determined by the Board of Directors from year to year and in a company approved by the Board of Directors. Expense of bond shall be borne by the Association.

SECTION 7. Assistant Secretaries shall have such duties as from time to time shall be designated by the Board of Directors.

Article IV—Meetings of Members

SECTION 1. The Annual Meeting of the Association shall be held at the time and place designated by the Board of Directors.

SECTION 2. Special meetings may be called by the President, with the approval of a majority of the Executive Committee, at such time and place as may be designated in such call.

SECTION 3. Notice of all meetings

shall be sent to the Members having a right to vote by the Managing Directors at least thirty (30) days in advance of the date set for the meeting.

SECTION 4. The number of Members present at any meeting having a right to vote shall constitute a quorum.

SECTION 5. The vote of a majority of the Members present in person or represented by proxy having a right to vote shall decide any question brought before such meeting, unless the question is one upon which by express provision of the statutes or of the Certificate of Incorporation or of these By-Laws, a different vote is required, in which case such express provision shall govern and control the decision of such question.

SECTION 6. At all meetings of Members, a majority of the Members present in person or by proxy may adjourn the meeting from time to time, but not for a period of more than thirty (30) days at any one time. At any such adjourned meeting, any business may be transacted which might have been transacted at the meeting as originally called. No notice of an adjourned meeting need be given.

Article V—Meetings of the Board

SECTION 1. An organization meeting of the Board of Directors shall be held immediately following each Annual Meeting of the Members at the place at which the Annual Meeting was held. Special meetings of the Board of Directors may be called by the President or by any three (3) Directors at such time and place as shall be designated in the call.

SECTION 2. Each member of the Board of Directors shall be notified in writing by the Managing Director at least two weeks in advance, as to the time, place, and purpose of a meeting of the Board of Directors, provided that with the written consent of at least five (5) Directors such notice may be reduced to not less than three (3) days.

SECTION 3. Seven (7) Directors shall constitute a quorum. The act of a majority of a quorum shall be the act of the Board, except when the statute, the Certificate of Incorporation or these By-Laws require a different vote. In the absence of a quorum, a majority of the Directors preesnt may adjourn the meeting from time to time, until a quorum is present.

Article VI—Election of Officers and Directors

SECTION 1. Nominations for officers and Directors shall be made by a nominating committee of three Fellows to be appointed by the President at the first executive session of any Annual Meeting; provided, this article shall not be construed so as to deprive any Member of his right to make nominations from the floor.

SECTION 2. Election of officers and Directors shall take place at the last executive session of the Annual Meeting.

SECTION 3. At each Annual Meeting there shall be elected to the Board of Directors six (6) Fellows to serve for a term of two (2) years.

SECTION 4. All officers and Directors of the Association, regardless of the term for which elected, shall hold office until their successors are elected and qualify.

SECTION 5. In the event of there being competitive nominations for any office, election shall be by ballot, and a majority of all votes cast for such office shall be required to elect. If after two ballots for any office there shall be no election, all but the two candidates receiving the highest number of votes shall be dropped from the ballot and the voting confined to the two so designated.

Article VII—Vacancies

SECTION 1. The Board of Directors shall have power to fill vacancies among the officers and Directors to serve until the next Annual Meeting of the Association or until their successors are elected and qualified.

Article VIII—Committees

SECTION 1. Executive Committee. The officers, other than Assistant Secretaries, of the Association shall constitute an Executive Committee which shall have such powers as may from time to time be designated by the Board of Directors.

SECTION 2. Committee of Past Presidents. All Past Presidents of the Association who are Fellows, Active or Honorary Members of the Association shall constitute the Committee of Past Presidents. This Committee shall act as an examining board to determine standards for Fellowship, examine candidates, serve as a certification board and as an advisory counsel to the Board of Directors, and shall perform such other functions as may from time to time be designated by the Board of Directors.

SECTION 3. Membership Committee. The Membership Committee shall consist of three or more Fellows or Active Members who shall be appointed by the President and whose duty it shall be to investigate and pass upon all applications for Membership before they are referred to the Board of Directors for consideration.

SECTION 4. Program Committee. The Program Committee shall consist of two or more Fellows or Active Members appointed by the President, and also the Managing Director, whose duty it shall be to provide the program for each meeting of the Members.

SECTION 5. Other Committees. The President shall appoint such other Committees as may from time to time be designated by the Board of Directors.

SECTION 6. Term. All committees shall hold office only until the Annual Meeting next following appointment.

Article IX—Dues

SECTION 1. The annual dues of Active Members shall be TEN DOLLARS per year; of Fellows FIFTEEN DOLLARS per year; and of Associate Members FIVE DOLLARS per year, which amount as to each Member and Fellow includes at least fifty percent (50%) of the basic annual price of one year's subscription to INDUSTRIAL MEDICINE, the official journal of the Association. Such part of the dues of component society members may be allotted to the respective component societies as may be from time to time determined by the Board of Directors. Dues shall be payable in advance on the first day of January of each year. Honorary Members shall pay no dues.

SECTION 2. Any Member whose dues are unpaid by the end of the current year is automatically dropped from Membership.

SECTION 3. Any Member dropped for nonpayment of dues may be reinstated at any time previous to the convening of the Annual Meeting of the year following his delinquency by payment of dues in arrears and also the dues for the current year.

Article X—Component Societies

SECTION 1. The Board of Directors shall have the power to take the necessary steps for organizing or admitting component societies.

SECTION 2. A local or regional organization of Industrial Physicians and Surgeons already established, may become a component society and its members admitted to Membership in this Association by making application therefor with a certification from their President and Secretary that their members meet all our requirements for Membership; have been carefully chosen and are all members in good standing of their local county medical society. Dues per member for current fiscal year and a copy of Constitution and By-Laws must accompany application.

SECTION 3. Any local or national organization of laymen or of another profession whose work and activities are closely allied to Industrial Medicine may become an affiliated society under conditions set up by the Board of Directors.

Article XI—Expulsion

SECTION 1. A Fellow or Member may be expelled for such cause as the Board of Directors may deem sufficient; provided that a copy of the charge made against him shall be furnished to him in writing at least thirty (30) days before the meeting at which such action is taken. A three-fourths vote of all Members of the Board of Directors expressed in meeting of the Board or in writing shall be required to expel a Member of the Association.

Article XII—Amendments

SECTION 1. These By-Laws may be amended by a two-thirds vote of the Members entitled to vote, present in person or by proxy, at any Annual Meeting of the Association; provided that notice of proposed amendments (in addition to the notice required by

these By-Laws for such meeting) must be given by publication in the official Journal of the Association at least thirty (30) days before the date set for the meeting.

SECTION 2. When a majority of the Board of Directors or two-thirds of the Executive Committee have certified in writing delivered to the Secretary that the holding of any Annual Meeting is inadvisable, such Annual Meeting shall not be held. In such case, the Board of Directors may submit to the Members of the Association having the right to vote by mail any question or action, including the election of officers and Directors and including amendment of these By-Laws, but not including any question or action required by statute, or the Certificate of Incorporation to be taken at a meeting. Such submission shall be made by ballots mailed to each Fellow and Active Member setting forth the action proposed and in case of election of Directors and officers, the names of the persons nominated. Only ballots returned within thirty (30) days after the mailing thereof shall be counted. In case of any proposed action, if a majority of the ballots is in favor thereof, such action shall be considered as adopted by the Members the same as if adopted at the Annual Meeting of the Members. The Directors and officers receiving the majority vote on such ballots, whether or not those nominated, shall be deemed elected to the same effect as if elected at the Annual Meeting of the Members.

Article XIII—Miscellaneous

SECTION 1. Seal. The corporate seal shall have inscribed on it the name of the Association and the words "Corporate Seal, Illinois."

SECTION 2. Fiscal Year. The fiscal year of the Association shall be from January 1st to December 31st.

SECTION 3. Checks, etc. No person shall have authority to sign checks, drafts or orders for the payment of money, or notes or acceptances unless specifically authorized by resolution of the Board of Directors.

SECTION 4. Notice. Except as otherwise provided by statute, notice when required to be given to any Director, officer, or Member, shall not be construed to be personal notice or notice in any particular manner but such notice may be given either by personal delivery to the Director, officer or Member, or by depositing the same in the United States Postoffice or letter-box, in a postpaid sealed wrapper, addressed to such Director, officer or Member at such address as appears on the books of the Association, or in default of other address, to such person with no other address than Chicago, Illinois. Notice shall be deemed to be given when and if mailed. All notices must be in writing, but may be typewritten or printed in whole or in part.

Any Member, Director or officer may waive in writing any notice to be given to him under these By-Laws or by law, unless counsel of the Association states that the waiver of any such notice required by law is, in his opinion, illegal.

The President may give the duty and power of serving any notice or notices required by law or by the By-Laws of this Association to any person and such notices shall be of the same force and effect as if served by the officer or officers designated by statute or by these By-Laws, provided that should the laws of the State of Illinois require the service of notice by any specific officer, such notice must be served by that officer. Such action shall not render ineffective any notice served by any officer pursuant to law or the By-Laws of the Association.

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Volume 14 MAY, 1945 Number 5

Announcement

At a meeting of the Board of Directors of the American Association of Industrial Physicians and Surgeons held on May 6, 1945, it was decided to hold an annual meeting and election of officers by proxy. This will enable us to carry on the business of the Association in accordance with the corporation laws of the State of Illinois covering our Association, and, we expect, will meet with the rulings of the Office of Defense Transportation.

This meeting will be held at the Association headquarters in Chicago on Friday, June 22. Notice will be sent to all members.

May 7, 1945. —Edward C. Holmblad, M.D.,
Managing Director.

"I Am the Doctor"

The title quotes a statement and an attitude—assuming, of course, that an attitude can be quoted. The statement is a perfectly proper one—when it is properly made; and the same is true of the attitude—when it is properly assumed. We are interested, however, in some instances where both were improper.

First, the statement. A man who held the title of psychiatric officer was explaining to a youth injured in an automotive smash-up that the pain in his arm was purely mental. His reason was that he said so. He was the psychiatric officer; *he* was "the doctor." An able orthopedist shortly found the physical basis of the pain, and the youth was spared the neurotic classification.

The war has given a terrific upsurge to psychiatry, and industrial psychiatry has come in for its share of interest. There are not enough psychiatrists with enough training so that they can make an honest approach to the terrifically difficult problem thus presented. The field, and particularly the industrial field, is therefore wide open to opportunists—of whom, unfortunately there are already too many. In the words of one of the country's really outstanding industrial psychiatrists, "this department of industrial medicine as an enterprise is slogging hard work." Whatever the scope of the psychiatric problem as it presents itself in employed people, the solution does not lie in theories, but in "hard conscientious research," the compiling and study of available data and tried procedures, and more hard work. A very great deal of this kind of preparation should underlie any professional right to say, especially in matters of psychiatry, "I am the Doctor."

Next, the attitude. A safety director made certain changes in his company's standing orders for nurses. He laid them before the plant physician and asked that they be signed. The physician, a newcomer to industrial medicine, signed them, quickly and perfunctorily—with less consideration for his profession than for his position. It was soon discovered that the changes should never have been made. The effect of the signature, however, was that of "I am the Doctor." Therein this physician missed his first chance to do what every industrial physician who is worthy of the name has found it necessary to do many times—namely, to assert, through his "I am the Doctor" attitude, that it is *his* business and *his* alone to look after the medical matters in the plant. These are two expressions of the same attitude—the one wrong, the other right.

Other expressions, similarly disturbing to the integrity of industrial medicine, are all too common. One that may be cited is the now often mentioned instance of the well-meaning but inexperienced private practitioner who confused siderosis with silicosis and diagnosed the former as the latter, with the result of great expense and trouble to all concerned. Another is the recent incident of the private practitioner who, having diagnosed lead poisoning in an employee never in all his life exposed to lead, still refused—in spite of overwhelming evidence of this lack of exposure—to change his diagnosis. Several others are mentioned in "Dr. Pilgrim" below.

"I am the Doctor," as both statement and attitude can be welcome, encouraging, effective and satisfying under proper circumstances. But the industrial physician who has the right to say it or to assume it even under proper circumstances is so competent and experienced that he never finds it necessary to do either.

Blocking Federal Legislation

The vicious attack on the U. S. Public Health Service and the various State Health Departments regarding their work in the field of industrial hygiene which was made in the report of the Committee on Compensation, Safety, Health and Welfare, at the 11th Conference on Labor Legislation in Washington last December (Industrial Medicine, 14:4, 288) included the charge that the Public Health Service was "blocking" Federal legislation. This charge is interesting, and we believe its phraseology should be examined. What is Federal legislation? Our understanding has been that nothing is legislation until it is law. We have not heard, however, that the U. S. Public Health Service is breaking the law. The term, therefore, must mean proposals emanating from a Federal source for laws to be enacted—in other words, bills drawn in an

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executive office in Washington, for Congress to pass. There have been a great many—too many—of such bills in recent years. Indeed, we are still not very far from the era of "must" legislation. Congress is not now doing altogether what it is told to do by the executive branches of the government; it has somewhat returned to its independent status as a separate co-equal branch of the government. But bills are still being drawn in executive departments, and, because Congress is asserting its independence, a vast amount of brain work is being put into the business of drawing them so that after they have passed they will be capable of almost any interpretation the sponsoring department wants to put upon them. This practice was quite successful for a while. But lately it, too, has been exposed. Witness the recent attack in the Senate on the bill, which was slipped through without debate, providing a fine of $10,000 or a 10-year prison term, or both, for persons divulging government codes and cryptographs, or information from coded messages. It was found, in afterthought, that this bill could gag congressional committees—which, no doubt, was its purpose.

This is an illustration of Federal legislation, and H.R. 525 is in the same category. We have previously discussed H.R. 525, and its predecessor bills written in identical words, in these columns. The present examination is concerned with the trick phraseology of its provision that "the available services and facilities of the Public Health authorities in the field of industrial hygiene shall be utilized." We believe this should be explained in full detail to every member of Congress. The explanation should cover every possible application of these words to anything that may be intended to be done, or that can be done, under the scope of the bill. For example, does the "shall be" mean that the available services are to be asked or ordered? Is it the intention that the utilization shall result from the bait of larger allocations of money from the $5,000,000 to those states which will transfer their industrial hygiene activities out of the State Health Department and into the State Labor Departments? A full and complete disclosure of intentions should be put into the records, the records to be made public, and the bill then so amended that these intentions—and furthermore all possibilities of all other intentions—should be definitely and plainly set forth in the text of the bill itself—as *limitations* on its meaning.

Now for the "blocking." If the demand for clearness of expression, statement of intentions, proof of necessity, and adequacy and value of results is "blocking" Federal legislation, then every individual, association, group, lobby or bloc, that has ever objected to a bill in the history of Congress has been "blocking." It is a part of the democratic process to do this kind of blocking. And it is expected of Congress and the Committees of Congress that they will permit the opportunity for this kind of blocking. When such opportunities are not permitted, there is real reason for suspicion that somebody is trying to put something over on somebody else. Right here, it is well to record the fact that the meeting of the Labor Committee of the House of Representatives which was called and held on April 25 to consider H.R. 525 was a closed session. Why? We are entitled to know.

DR. PILGRIM

NOW much concerned with pending legislation in California proposing that wherever an employee is exposed to substances which may cause a pneumoconiosis, it may be presumed that the pneumoconiosis was contracted in such employment where claim is made that such was the case —whereof there is reason to muse on the great gap between the application of scientific knowledge and the use of the same in the making of laws. . . . AND busy in the laboratory with respect to recent samples taken in a pottery in the Rocky Mountain area. . . . AND making arrangements for talks at Lansing, Michigan, and at Columbus, Ohio, with reference to management's responsibility for industrial hygiene work and the labor relations value of such activities. . . . THEN, speaking before the panel on Industrial Hygiene Services on "Private Consultants and Universities," as a part of the Chicago Technical Societies Council's all-day meeting where was great interest as to the availability of industrial hygiene services and the kinds of agencies rendering the same. . . . THEN to Lansing and Detroit. At the former, a dinner talk to a mixed group, and where there were many questions and much intelligent discussion of management's part in the prevention of accidents and disease, and all next day at the Industrial Medical and Surgical Conference sponsored by the Michigan Medical Society and the Committee on Industrial Health of that society, with many new subjects and excellent discussions and presentations. . . . WHEREFROM to Central Missouri for a technical survey in a firebrick plant, with air sampling and other activities, and in conference with DRS. DAVID LE MONE, HARRY O'BRIEN and company officials on x-ray findings of the chests of a certain group of exposed employees. . . . THEN home, to study of testimony in a case of alleged electrocution occurring in Kentucky, in which there was no scintilla of evidence that the deceased had ever come in contact with electric current, all of the medical evidence pointing to the fact that he died of a heart lesion which had been existing for a number of years. . . . AND a very interesting meeting sponsored by the Chicago Film Workshop in Adult Education, a special gathering on public health in which there was shown a sound motion picture film on "Men and Dust;" a similar picture, "Defense against Invasion," which had to do with vaccination; and also "To the People of the U.S.A.," a direct and straight-forward presentation on venereal disease, from all of which one was deeply impressed how easy it is to film material and have it give the wrong impression, these films being a contrast between (1) proper production and adequate scientific supervision, and (2) the lack of them, the latter two being very well done because of the use of proper technical information and authorities, and there being great interest in the remarks of MR. BEN J. VAN KORN, Director of Education for the Chicago Venereal Disease Program, Chicago Public Health Service, MR. WARREN COOK, of Zurich, and MR. C. F. SCHEER, of the same company, who referred to an employee who developed an occupational disease because he worked in a veneer factory! . . . THEN engrossed in the study of a necropsy report on an alleged case of silicosis in a neighboring state, where previous occupational history, exposure, symptomatology, examinations, including x-rays, showed no evidence of silicosis, and wherein there now comes the necropsy report with the allegation that deceased died of chronic heart failure due to emphysema associated with miliary silicosis—being here again confronted with the problem of properly associating cause and effect, it seeming quite clear that in this instance the deceased had had asthma for a considerable length of time, accompanied by emphysema, gradually leading to chronic and acute heart failure. . . . AND later concerned with the reading of evidence in a case of alleged eye injury in which claimant was supposed to have developed iritis, adhesions, and cataracts from exposure to untra-violet rays, there being considerable difference in opinion among the ophthalmologists as to what the actual condition was in the eyes of the claimant without even considering the etiology.

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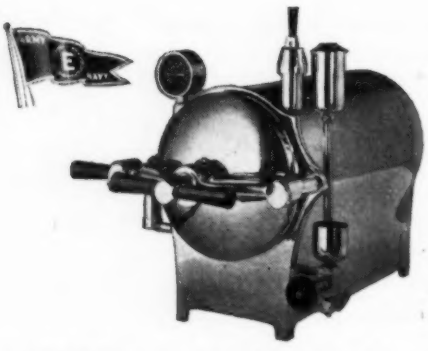

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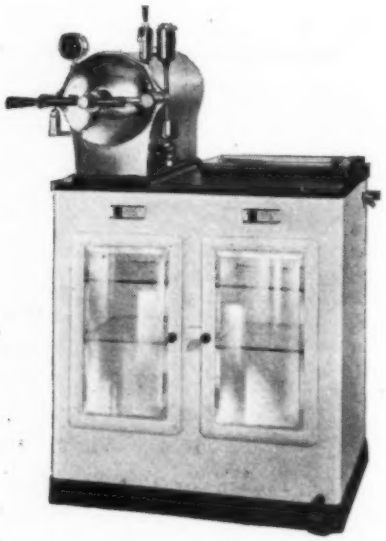

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Matching the Physical Characteristics of Workers and Jobs

BERT HANMAN,
Occupational Analyst, War Manpower Commission,
San Francisco, California

PREFACE: In developing personnel relations to the greatest satisfaction of the worker, the employer, and the community, *selective placement* is that process whereby the worker is chosen and assigned to that job (1) which will afford the greatest utilization of his skills and aptitudes, and (2) which at the same time will be compatible with his physical capacities and protect his health and safety. These two steps in the selective placement process may be referred to more readily as (1) matching the *skill characteristics* of workers and jobs, and (2) matching the *physical characteristics* of workers and jobs.

Existing techniques for relating *skill characteristics* are relatively adequate when compared with methods for matching *physical characteristics*. It is believed, therefore, that the emphasis should be placed on the development of better techniques for relating the *physical capacities* of workers to the *physical demands* of jobs. Evidence of this emphasis is to be found in the many and varied efforts of industry and government to find a solution to the *physical* aspects of the selective placement problem. The primary motivation for this emphasis is based on the desire to make it possible to place all workers successfully and safely on jobs in accordance with their physical capacities, particularly disabled veterans.

This material represents a study of existing practices in the United States for matching the *physical characteristics* of workers and jobs. Many plans of both industry and government are presented. Rather than trying to catalogue all plans, however, the attempt has been made to present selected plans, each of which is representative of a certain direction of thought. Each plan presented makes no reference to its use by a specific plant or agency. Each plan is discussed purely as *a plan*.

This particular method of anonymous presentation has been selected in the hope that it will stimulate the objective appraisal of the reader and encourage criticism of existing practices. If this material does nothing more than to suggest the limitations of existing techniques and to encourage others to undertake research to explore and to develop this problem further it has served its purpose a thousand times.

The writer is indebted to a number of persons and organizations for assistance in this work. Deepest gratitude is expressed to CLARENCE D. SELBY, M.D., Medical Consultant, General Motors Corporation, Detroit, Michigan, for his inspiring guidance and for furnishing the introduction to this material.

For many valuable suggestions and technical criticism, grateful appreciation is expressed to J. G. TOWNSEND, M.D., Medical Director, Chief, Division of Industrial Hygiene, National Institute of Health, U. S. Public Health Service, Bethesda, Maryland; to CAPTAIN HENRY H. KESSLER, MC, USNR, Chief of Rehabilitation, United States Naval Hospital, Mare Island, California; to ROBERT T. LEGGE, M.D., Past-President, Western Association of Industrial Physicians and Surgeons, Berkeley, California; to WALTER H. BROWN, M.D., Acting Dean, School of Public Health, University of California, Berkeley; to RUTHERFORD T. JOHNSTONE, M.D., President, Western Association of Industrial Physicians and Surgeons, and Director, Department of Occupational Diseases, Golden State Hospital, Los Angeles; to HEDWIG S. KUHN, M.D., Secretary, Joint Committee on Industrial Ophthalmology, American Medical Association and American Academy, Hammond, Indiana; to EDWIN E. GHISELLI, Associate Professor of Psychology, University of California, Berkeley; to M. F. COLLEN, M.D., Director, Medical Department, and CLIFFORD KUH, M.D., Director, Department of Public Health and Preventive Medicine, Permanente Foundation Hospitals, Oakland; to FRANK J. CLAYTON, Regional Representative, Office of Vocational Rehabilitation, San Francisco; to MAJOR S. R. PARKINSON, MC, AUS, Director, and MINER CHIPMAN, JR., Medical Administrator, Army Industrial Medical Program, Ninth Service Command Unit 3991, California Quartermaster Depot, Oakland; to LYNN L. PROUT, Personnel Officer, California Quartermaster Depot, Oakland; to FRANCIS B. QUINN, M.D., Regional Medical Director, U. S. Civil Service Commission, San Francisco; and to F. W. HUNTER, Regional Director, and W. B. MCCARTER, Chief, Bureau of Manpower Utilization, War Manpower Commission, San Francisco.

It is regretted that the anonymous presentation of this material makes it difficult to express the proper acknowledgments to the many others who have contributed to this work. To the numerous workers whose published research has been drawn on, and to others in industry and government who have helped with various parts of this material, the writer is happy to acknowledge his sincere appreciation.
San Francisco, California. —BERT HANMAN.

Introduction

IT SEEMS to me that the thinking of those of us concerned over a solution to the problem of selective placement is beginning to crystallize. At least in connection with the relation of human attributes to job performance we are becoming clearer as to the factors requiring deeper inquiry. Particularly are we beginning to see that the physical aspects of every man and job require our concerted attention. It should be the business of the personnel officer, industrial physician, job analyst, industrial engineer, safety engineer, training officer, counselor, supervisor, and insurance man to come together to evaluate present practices and to work toward the refinement of selective placement systems.

In discussing the physical aspects of selective placement let us consider:

1. *Capacities versus Handicaps:* Why identify a physically handicapped worker with his disability and thus stress his negative characteristics? Why not look upon workers from the viewpoint of their *physical capacities* rather than concern ourselves with their limitations? Why not focus our attention on the positive side of the question —what actually are the physical capacities of this worker regardless of his disabilities? Why not look upon *all* workers as having various degrees of physical fitness for work and forget references to physical handicaps and disabilities?

It may be possible that the industrial physician has been partly at fault for some of the negative concepts. Too often has the industrial physician dealt in terms of *disabilities* rather than *abilities*. Too often has the industrial physician given the personnel officer the worker's diagnosis, the worker's handicap label, or a brief and general statement on the worker's condition, and thereby faultily placed on the personnel officer the responsibility for interpreting such information in terms of physical fitness for work.

Too rarely has the industrial physician accepted the responsibility for translating diagnostic data into common terms of physical capacities for work. While true at this time that it is difficult for the physician to determine how much lifting, standing, or stooping a worker can do, the fact remains that no one is better qualified than the physician to make such determinations. One thing is certain, this responsibility does rest with the physician.

For the industrial physician to accept the responsibility for determining physical capacities for work is important. First, it will foster the positive outlook as to what workers *can do* and will tend to dissolve our "handicapped" thinking. It will uproot the tendency among us to believe that the physically handicapped also are occupationally handicapped. By dealing in terms of capacities rather than handicaps, it will keep the diagnosis confidential and create a common language for those engaged in placement work. And, finally, it will make it possible for us to place all

workers on those jobs for which they are physically qualified—the young, the old, the able-bodied, the physically limited, the man, the woman—all placed on the job which is commensurate with their physical capacities.

2. *The Individual versus Disability Groups:* Having had our conceptions colored with past and present beliefs to the effect that handicapped workers should be dealt with on the basis of their disabilities rather than capacities, there have been rather elaborate systems developed for classifying physically limited workers into various disability groups. The thought prevails that having classified workers according to their disabilities it is then also possible to classify jobs into corresponding groups which will be suitable for the physically handicapped workers in a particular disability group. Unfortunately, the selective placement process is not this simple.

There are individual differences in the physical capacities of workers and there are individual differences in the physical demands of jobs. It we rated all workers on their capacity for walking, the range would extend from those who could not walk at all to those who could walk all day. And, likewise, if we analyzed the extent to which walking is required by jobs, the range would extend from none to the full length of the work period. We would also find this full range in the physical capacities of workers and in the physical demands of jobs for each of the many physical factors required by jobs, such as lifting, crouching, hearing, handling, working in noisy surroundings, working in wet quarters, and working on high places. For each of approximately 75 factors, then, the capacities of workers would cover a range from 0 to 100% and the demands of jobs would cover a range from 0 to 100%. Whether or not the frequency distribution curve for each factor would follow the contour of the normal frequency curve is unimportant. The *range* in each of the 75 factors sufficiently indicates that each worker's physical capacities should be considered as forming an individual pattern and that each job's physical demands should be considered as forming an individual pattern.

In addition, when we evaluate the physical capacities of workers within any disability group, such as blind, deaf, or one-armed workers, we find that the individual differences among the workers in any one group are as great for most activities as the individual differences among the physically fit. For instance, some one-armed workers will not or cannot use prosthetic aids while others will be fully compensated and have more capacity for some activities than two-armed workers. As a result of the individual differences among workers within any disability group, attempts to match workers and jobs on the basis of disability groupings are superficial.

For these reasons, therefore, all handicapped workers should be considered on the same basis as the physically fit, that is, each according to his individual pattern of physical capacities. Through the individual approach we will be able to relate each worker's pattern of physical capacities to the physical demands patterns of those jobs which are in accord with the worker's physical capacities.

3. *Specific Approach versus General Approach:* Suppose we agree, then, that the selective placement process should function on the basis of capacities rather than handicaps and on the basis of individuals rather than disability groups. How then do we analyze the physical capacities of individual workers and the physical demands of individual jobs?

It appears that the greatest number of current plans are founded on various approaches attempting to answer this question. By and large the many approaches may be grouped into two schools of thought—one suggesting the general approach and the other suggesting the specific.

In the general approach the physical capacities of workers and the physical demands of jobs are both classified according to a rating scale. Many types of rating scales are used, such as "arduous, moderate, light, or very light"; "A, B, C, or D"; "constantly, frequently, or occasionally"; and "none, little, moderate, or great." With such ratings it is believed that the C worker can be placed on the C job (providing he meets the skill requirements), or that the worker who can do moderate lifting can be placed on the job requiring moderate lifting.

The second school using the specific approach believes that rating scales are deficient since it has not been possible to define adequately the terms used in the scales. One physician will rate a worker as having capacity for light lifting while another physician will rate the same worker as being capable of moderate lifting. One job analyst will rate a job as requiring heavy lifting while another will rate the same job as requiring moderate lifting.

The second school of thought therefore believes that rating scales serve no real purpose, that the secret lies in abandoning rating scales and merely recording the facts. For instance, this job requires lifting 50 pounds one hour per day. Can this worker lift 50 pounds one hour per day? This school would make no attempt to say whether lifting 50 pounds one hour per day is A, B, C, or D lifting. Why be concerned about its being A, B, C, or D lifting, they ask, particularly when different physicians and analysts are likely to rate it as being either A, or B, or C, or D lifting? Why not work with the simple facts—50 pounds, one hour per day?

While it may be likely that the solution we seek lies somewhere in the direction of the specific approach, it is my opinion that the many and varied plans now used in the United States are evidence that a standardized system is yet to be developed. It is true that much is to be gained from a study of existing plans but we should not stop here. How is the industrial physician to expand his knowledge and ability to analyze the physical capacities of workers? How is the job analyst to refine his methods? How is the personnel officer to collate data on the physical and skill characteristics of workers and jobs? How are the industrial engineer and the safety engineer to participate by reducing the physical demands and hazards of jobs? How will the counselor and the training officer best be able to use physical demands and capacities information in rehabilitating the disabled? What about the psychoneurotic and his job adjustment? What are the accident insurance and disability compensation relations to be? How are these techniques to be developed to allow for proper on-the-job supervision, up-grading, follow-up, and evaluation? To list the questions is not enough—these are a few which remain to be answered.

Again the suggestion is made that the personnel officer, industrial physician, job analyst, industrial engineer, safety engineer, training officer, counselor, supervisor, and insurance man come together to evaluate present practices and undertake research which will help develop and standardize selective placement procedures.

Detroit, Michigan. —CLARENCE D. SELBY, M.D.

I. Personal Knowledge Approach

IN A NUMBER of the smaller industrial plants throughout the United States, and, surprisingly, in a few of the larger ones, placement practices are dependent on the knowledge which is known personally by a very few people in each plant. This personal knowledge is usually gained from observing the jobs in the plant and from trial and error placement experience. As a rule the company's personnel policies and placement procedures are not put in writing, job descriptions are not prepared, employment tests are not used, results of physical examinations are reported either in terms of the diagnosis or in general statements, hiring is based on the judgments made during a brief interview, and the success of the company's employment practice is contingent on the personal knowledge and ability of the placement officer to a great degree.

Most plants using this *personal knowledge approach* encounter many difficulties, particularly in times of a stringent labor market and also when converting to the production of new commodities. The difficulties are attributable largely to the fact that this approach does not provide adequate information on the skill and physical capacities of workers and on the skill and physical requirements of jobs in order to facilitate the matching of workers and jobs. Under this system the placement officer is at a loss to deal properly with the workers forced upon him by a stringent labor market. Likewise, during a period of conversion, he is unable to form reliable mental pictures of the new jobs since they are created faster than he can observe them. Labor turnover is increased and

production rates impaired as a result of the placement officer's inability to match workers and jobs successfully under this system.

In the few relatively successful practices of this kind, however, the placement officer has usually been with the company for many years and has actually worked at many jobs in the plant. He knows the departments, the foremen, the machines, the jobs, and many of the workers. This placement officer also knows the plant physician or the outside physician who serves the plant. The two of them have many informal meetings and gradually develop a remarkable understanding of each other's problems. Often the physician also is familiar with many jobs in the plant. The placement officer and the physician form a team, and, as a result of their long experience with trial and error placement methods, the two of them become experts at making judgments as to a worker's probable success on a job.

Such experts, however, are rare. There are no books on how to become one and there are no tests for selecting them. Their qualities of judgment are based on a combination of intelligence, long experience, and an intimate personal knowledge of the workers and jobs in a particular plant. Should they leave the company for reasons of health or for other employment they are practically impossible to replace. Companies using the *personal knowledge approach*, therefore, may find themselves in a precarious situation should the services of these men be lost.

II. Jobs Suitable for Disability Groups

THEORY: In the earlier stages of selective placement work it was the common belief that if a suitable list of jobs could be compiled for each disability group, such as for one-eyed, one-armed, and one-legged workers, it would then be possible to place the physically handicapped by referring to the particular list indicated by the individual's disability and there select the job for which the individual possessed the skill or aptitude. On this theory many such lists have been compiled. Some have been discontinued and the theory discarded, some are still in use, and in a few cases new lists are in the making.

COMPILATION AND PRESENTATION: These lists, or, as they are sometimes called, job families for the physically handicapped, are compiled and presented in several ways:

1. The jobs are analyzed by industrial physicians on a prescribed form (Fig. 1a) and the information processed according to disability code numbers (Figs. 1b, 1c and 1d).
2. The jobs are analyzed by job analysts and the information processed according to disability code letters (Fig. 2a) and according to skills and disabilities (Fig. 2b).
3. The jobs are analyzed by a team consisting of industrial physician, safety engineer, personnel officer, industrial relations representative, and factory superintendents and foremen. The unanimous agreement of all team members is required before a specific job is approved to appear on a specific disability list (Fig. 3).
4. The jobs in a community are analyzed by an employer survey committee to determine the job possibilities for the physically handicapped (Fig. 4).

ADVANTAGES: 1. Such lists of jobs for the physically handicapped fill several sizeable volumes which are impressive in appearance and which have an excellent educational value when it is necessary to stress the point that every job does not require an able-bodied worker, that many jobs may be performed successfully by the physically handicapped. One large company found this education value to be worth the price of a factory-wide survey, after which the superintendents and foremen were agreeable to utilizing the physically handicapped.

2. They supplement the interview to the degree that they suggest possible jobs for the physically handicapped to the placement interviewer.

3. They have contributed to the experience of those engaged in placing the physically handicapped.

DISADVANTAGES: 1. These disability lists are time consuming and costly to compile.

2. They emphasize the worker's limitations which leads to his being classified according to his *dis*abilities instead of pointing up his physical *abilities* which may be used in many jobs.

3. They assume that all individuals with a specific disabiilty, such as one hand, are incapacitated to the same degree, whereas there are wide variations in the capacities of individuals in any disability group.

4. They tend to limit work opportunities by identifying workers with a specific list of jobs instead of providing information which would enable a worker's physical capacities to be matched with any job which does not exceed his capacities.

5. They assume that jobs having the same job title have a similar pattern of physical demands, whereas there are often significant variations in the physical demands of the same job in different locations.

6. They have been proved to be of little or no value to the placement interviewer as a placement tool. Instead of using the lists, the interviewer soon learns that he must deal with the handicapped worker as an individual rather than as belonging to a disability group, and that he must place the worker by matching the

Figure 1c.

JOB ANALYSIS
FOR PHYSICAL FITNESS REQUIREMENTS

Title of Position

I. FUNCTIONAL FACTORS IN PERFORMANCE OF DUTIES (*Check all functional factors involved in performance of duties*)

A. *FINGERS*	B. *LEGS*	C. *BODY TRUNK*	D. *ARMS*
1. Pressing ☐	1. Balancing ☐	1. Bending ☐	1. Pressing ☐
2. Holding ☐	2. Turning ☐	a. Flexion ☐	2. Holding ☐
3. Pulling ☐	3. Pushing ☐	b. Extension ☐	3. Pulling
4. Picking ☐	4. Squatting ☐	2. Lifting ☐	a. Hand-Over-Hand ☐
5. Grasping ☐	5. Pressing ☐	3. Torsion ☐	4. Flexion ☐
6. Reaching ☐	6. Running ☐	4. Rotation ☐	5. Extension ☐
7. Touching ☐	7. Climbing	5. Flexion and Extension of Cervical Spine ☐	6. Rotation ☐
8. Cutting with shears ☐	a. Stairs ☐		7. Hammering ☐
	b. Ladders ☐		8. Throwing ☐
	8. Walking ☐		
	9. Lifting ☐		
	10. Holding ☐		
	11. Prolonged standing ☐		

E. *VISION*	F. *HEARING*	G. *HEIGHT-WEIGHT*
1. Near Vision Bilateral ☐	1. Ordinary Conversation ☐	1. Reaching requiring at least average height (67"—68") ☐
2. Near Vision Unilateral ☐		
3. Far Vision Bilateral ☐		
4. Far Vision Unilateral ☐	2. Whispered Speech ☐	2. Operation of machinery requiring average height ☐
5. Depth Perception ☐		
6. Color Discrimination		3. Climbing through small apertures ☐
a. Shades of Color ☐		
b. Basic Saturated Colors ☐	3. Detection of high pitched sound in machinery indicative of mechanical disorders ☐	4. Walking along narrow catwalks or passageways ☐
7. Muscle Balance ☐		
8. Motor Vehicle Operation Vision ☐		5. Agility ☐

II. ENVIRONMENTAL FACTORS (*Check all environmental factors involved in performance of duties*)

1. Excessive Light ☐	7. Excessive Noise and Reverberation ☐
2. Excessive Heat ☐	8. Dusts ☐
3. Excessive Humidity ☐	9. Gases ☐
4. Excessive Air Pressure ☐	10. Toxic Metallic and Non-Metallic Elements ☐
5. Lowered Air Pressure ☐	11. Radioactive Elements ☐
6. High Elevations ☐	

individual's specific skill and physical capacities with the skill and physical requirements of a specific job. One large national organization, after compiling sufficient disability lists to form a volume approximately six inches thick, discontinued the compilation, distribution, and use of its lists in 1943. A large company which made a factory-wide survey to compile disability lists, did so for the educational value of the survey and did not use the lists as a placement tool.

7. The educational value of these lists is questionable at this point in employment history since most employers now know that many jobs can be successfully performed by the physically handicapped. In addition, employers often point to facts and figures to show that the physically handicapped have records as good as, if not better than, the physically fit in connection with production rates, absenteeism, sickness and accident rates, and turnover.

III. Rating Scale Approaches

THEORY: Realizing the shortcomings of disability lists as a placement tool for the physically handicapped, the step was taken to break away from the list technique and to deal with both workers and jobs in terms of the physical and environmental factors required by jobs, such as *standing, lifting, hearing, working outside,* and *working on high places.* By approaching the problem from the viewpoint of the component physical environmental factors required by jobs, the belief is that workers and jobs may then be matched by determining (1) the degree to which the factors are required by jobs, and (2) the degree to which the factors may be performed by workers. In order to determine the degree, the almost universal approach has been to analyze the factors in terms of a rating scale. Many rating scales are being used, such as:

1. Arduous—Moderate—Light—Very Light.
2. Great—Moderate—Little—None.
3. Constantly—Frequently—Occasionally—Never.
4. Above Average—Average—Below Average—None.
5. Considerable—Limited—None.
6. All the Time—Part Time—Never.
7. Present—Absent.
8. Yes—No.
9. 3/3—2/3—1/3—0.
10. A—B—C—D.
11. 1—2—3—4.
12. + —.

Figure 1a—Continued

III. RESUME (*Check Opinions*).

A. *VISION*	B. *EXTREMITIES*	C. *BODY TRUNK*
1. *DISTANT* a. Good vision in one eye required with or without glasses ☐ b. Good vision in both eyes with or without glasses ☐ c. Good vision required in one eye without glasses ☐ d. Good vision required in both eyes without glasses ☐ 2. *NEAR* a. Good near vision in one eye (J1 or J2) required, with or without glasses ☐ b. Good near vision in both eyes (J1 or J2) required with or without glasses ☐ c. Good near vision required (J1 or J2) without glasses ☐ 3. *COLOR VISION* a. Color vision essential ☐ b. Color vision not essential ☐ 4. *DEPTH PERCEPTION* a. Required ☐ b. Not required ☐	1. *HANDS* a. One hand intact sufficient for performance of duties ☐ b. Two hands intact necessary for performance of duties ☐ 2. *ARMS* a. One arm sufficient for performance of duties ☐ b. Two arms necessary for performance of duties ☐ 3. *LEGS* a. One leg sufficient for performance of duties ☐ b. Two legs necessary for proper performance of duties ☐ 4. *JOINTS* a. Free motion of elbow, wrist and fingers required ☐ b. Limited motion of elbow, wrist and fingers would not impair proper performance of duties ☐ c. Free motion of knee joints required ☐ d. Free motion of knee joints not required ☐	1. *CERVICAL REGION* a. Free rotation required ☐ b. Free lateral and anterior and posterior flexion required ☐ c. Free rotation and flexion required ☐ 2. *DORSAL* a. Free motion of dorsal spine required ☐ b. Free motion of dorsal spine not required ☐ 3. *LUMBAR* a. Free motion of lumbar spine required ☐ b. Free motion of lumbar spine not required ☐ 4. *JOINTS* a. Shoulder and hip joints must have free motion in all planes ☐ b. Not necessary that shoulder and hip joints have free motion in all planes ☐

D. *CARDIOVASCULAR*	E. *RESPIRATORY*	F. *HEIGHT-WEIGHT*	G. *HEARING*
1. *BLOOD PRESSURE* a. Moderate. Hypertension renders employee hazard to himself and fellow employees ☐ b. Severe. Hypertension renders employee hazard to himself or fellow employees ☐ c. Moderate. Hypertension under medical supervision acceptable ☐ 2. *HEART* a. Organic heart disease fully compensated does not represent undue risk in this position ☐ b. Organic heart disease whether or not compensated represents undue risk in this position ☐	1. *LUNGS* a. History of tuberculosis whether healed or arrested renders employee undue risk in this position ☐ b. Tuberculosis arrested not undue risk in this position ☐ c. Persons receiving pneumothorax treatment or other types of collapse therapy not undue risk in this position ☐ d. Persons receiving pneumothorax treatment or other types of collapse therapy are undue risk in this position ☐	1. Duties require that employee be agile, necessitating proportionate weight in relation to height ☐ 2. Duties require that employee be able to work in small spaces or enter small openings, making obesity undesirable ☐ 3. Height and weight have no bearing on proper performance of the duties ☐	1. Hearing must be acute in both ears for high pitched sound ☐ 2. Hearing must be acute in one ear for high pitched sound ☐ 3. Hearing must be acute for ordinary conversation ☐ 4. Deafness in one or both ears, either partial or complete, would not interfere with proper performance of duties ☐ 5. Defective hearing would be an asset in the performance of the duties ☐

REMARKS:

(Signature of Physician Making Survey)

(Date of Survey) (Title)

This form has been used by industrial physicians to analyze the physical requirements of jobs, the physicians depending upon safety engineers, medical advisors, and foremen for collateral information. Completed forms are coded according to Figure 1b and processed as shown in Figures 1c and 1d.

REPRESENTATIVE EXAMPLES OF RATING SCALE APPROACHES: In this Chapter rating scale approaches of the pure type are discussed.

Rating scales which also contain disability information and rating scales with modified information are discussed in Chapters IV and V.

1. As a pure type of rating scale, one of the simplest methods for rating the physical characteristics of workers and jobs is to deal with the physical demands of jobs and the physical capacities of workers as a composite. For instance:

The *over-all* physical demands of the job are rated as requiring work which is:

A—Arduous.
B—Moderate.
C—Light.
D—Very light.

The *over-all* physical capacities of the worker are rated as being suitable for work which is:

A—Arduous.
B—Moderate.
C—Light.
D—Very Light.

The B worker, then, theoretically, can be placed on a B, C, or D job as far as his physical qualifications are concerned.

2. Another rating scale device examines six features of an individual in order to secure a profile of the individual's physical make-up:

(1) Physical capacity or stamina—(P).
(2) Upper extremities—(U).
(3) Lower extremities—(L).

Figure 1b.

DISABILITY CLASSIFICATIONS WITH CODE NUMBERS[1]

	Code Number
1. Orthopedic:	
(a) Amputation of:	
Arm[2]	01
Arms	02
Hand[2]	03
Hands	04
Fingers[3]	05
Leg[4]	06
Legs	07
Foot[2]	08
Feet	09
(b) Disability or deformity of:	
Hip or shoulder	12
Arm	13
Arms	14
Hand[2]	15
Hands	16
Fingers[5]	17
Leg[2]	18
1. Orthopedic—Continued.	
(b) Disability or deformity of—Continued.	
Legs	19
Foot[2]	20
Feet	22
Back	24
Hips or shoulders	26
2. Vision defects:	
Blind	28
Blind in one eye with good vision in the other eye	30
3. Hearing defects:	
Deaf[6]	31
Hard of hearing[7]	33
4. Chronic diseases:	
Cardiac[8]	37
Tuberculosis (pulmonary)[9]	44
5. Miscellaneous:	
Dwarf	39

[1] A combination of disability code numbers listed for any particular position is not necessarily to be interpreted to indicate that a combination of all the defects would be acceptable for placement in that position.

[2] With other member intact and fully functioning.

[3] One or more fingers missing on secondary hand with good residual grasping power in that hand and normal function of primary hand. In some positions good grasping power not required in secondary hand.

[4] Amputation one lower extremity with satisfactory prosthesis and with other lower extremity intact and fully functioning.

[5] One or more fingers disabled on secondary hand with good residual grasping power in that hand and normal function of primary hand. In some positions grasping power not required in secondary hand.

[6] Sense of hearing nonfunctioning for ordinary purposes of life. Code number may include deaf mutes, depending upon amount of communication required in routine performance of duties of position in question.

[7] Sense of hearing although defective, functional with or without hearing aid.

[8] Organic heart disease, other than coronary disease, fully compensated without history of decompensation.

[9] Tuberculosis healed or arrested according to classification of National Tuberculosis Association. For some positions of sedentary type and in suitable working environment, persons receiving collapse therapy may be considered.

These code numbers have been used to code the information reported by industrial physicians in Figure 1a. After coding, the physicians' forms are processed as shown in Figures 1c and 1d.

Figure 1c.

AMMUNITION, EXPLOSIVES, AND FIREARMS

Occupational code	Title of position	Region and establishment	Disability placement code
6-78. 512	Grinder, disk	303	05, 06, 08, 12, 15, 17, 18, 20, 31, 33.
4-78. 512	Grinder, internal	303	05, 06, 08, 12, 15, 17, 18, 20, 31, 33.
4-78. 513	Grinder, surface	303	05, 06, 08, 12, 15, 17, 18, 20, 31, 33.
4-75. 130	Instrument maker	303	05, 06, 08, 12, 13, 17, 18, 20, 33, 37.
4-75. 130	Instrument maker, junior	303	05, 06, 08, 12, 13, 17, 18, 20, 31, 33, 37.
7-94. 200	Instrument-maker helper	303	05, 06, 08, 12, 13, 17, 18, 20, 33, 37.
0-15. 01	Junior engineering aide	303	06, 08, 12, 18, 20, 30, 31, 33, 37, 44.
5-09. 061	Junior lens grinder	303	06, 08, 12, 18, 20, 31, 33.
4-46. 200	Lay-out man, photolithographic	303	06, 08, 12, 18, 20, 30, 31, 33, 37, 44.
8-49. 02	Lay-out man, photolithographic helper	303	06, 08, 12, 18, 20, 30, 33, 37, 44.
6-62. 160	Leather worker	303	30, 33.
5-09. 061	Lens grinder	303	06, 08, 12, 18, 20, 31, 33.
5-83. 641	Machine adjuster	303	06, 08, 18, 20, 30, 31, 33.
9-64. 44	Machine operator, automatic-screw machine	303	33.
6-88. 632	Machine operator, drawpress	303	06, 08, 12, 18, 20.
6-88. 627	Machine operator, forming-press	303	06, 08, 12, 18, 20.
6-78. 144	Machine operator, hand, screw	303	33.
6-33. 373	Machine operator, lathe	303	33.
6-88. 632	Machine operator, metal cartridge-case	303	06, 08, 12, 18, 20.
4-78. 031	Machine operator, milling machine	303	33.
6-88. 624	Machine operator, punchpress	303	06, 08, 12, 18, 20.
4-75. 020	Machinist	303	06, 08, 18, 20, 30, 31, 33.
5-78. 100	Millwright	303	33.
8-93. 77	Moveman	303	06, 08, 12, 18, 20, 30, 31, 33.
9-64. 44	Munitions handler	303	30.
9-71. 01	Oiler	303	33.
9-64. 44	Operator, bindery	303	30, 33, 37, 44.
8-42. 51	Operator, explosives	303	33.
4-73. 530	Operator, graduating and engraving machine	303	06, 08, 18, 20, 31, 33.
4-33. 914	Operator, machine, wood	303	06, 08, 12, 18, 20, 31, 33.

One way of processing the completed and coded forms (Figures 1a and 1b) has been to show, by industry, all the disabilities a specific job will allow a worker to have. For instance, in the ammunition, explosives, and firearms industry, the first job in the above list is suitable for workers with missing fingers, foot, and leg; with disabled or deformed fingers, hand, foot, leg, hip, and shoulders; and with little or no hearing.

(4) Hearing; ears—(H).
(5) Vision; eyes—(E).
(6) Neuropsychiatric—(S).

Each of these six features is rated according to a 4-point scale. Each of the four points may be roughly defined as follows:

1—Excellent.
2—Average.
3—Moderate.
4—Below Minimum Standards.

The physical profile of an individual with poor vision is shown in Fig. 5.

3. The more generally used pure type of rating scale evaluates the physical characteristics of workers and jobs by dealing individually with the numerous physical and environmental factors required by jobs. No composite rating for the worker or job as a whole is used. Each of the factors is rated separately.

The form shown in Fig. 6a is representative of several plans which use this approach. While this form is used to analyze the physical demands of jobs, a similar format may be used to analyze the physical capacities of workers. One way of processing such information on jobs has been to show the physical requirements in conjunction with the skill relationships of jobs as illustrated in Fig. 6b.

Another plan of this type is shown in Figs. 7a and 7b. In examining these illustrations it is to be noted that the information secured on jobs (Fig. 7a) parallels the information secured on workers (Fig. 7b) in order to facilitate the matching of the two. Also, attention is called to the treatment given the items under "Protection."

Figure 1d.

POSITIONS SUITABLE FOR PERSONS WITH AMPUTATION OF ONE ARM (01)

Title of position	Region and establishment
Storekeeper	105
Operator, elevator	106
Operator, elevator, chief	106
Clothing examiner	201
Telephone operator	204
Washman (laundry)	204
Stationary engineer (utilities)	205
Soreroom clerk, garage supplies	205
Tool clerk (engineering)	205
Artist, scenic	206
Clerk, information	206
Custodian, property	206
Retoucher, photographic	206
Naval inspector, radio (supervisor)	207
Charwoman, head	208
Custodian, assistant	208
Marble polisher	208
Architect	301
Inspector, construction	301
Inspector, construction, electrical	301
Inspector, construction, mechanical	301
Inspector, engineering material, electrical	301
Inspector, engineering material, mechanical	301
Plastic molder	307
Lap grinder (quartz crystal)	308
Electrician, shop	409
Master mechanic	409
Storekeeper	409
Storekeeper, assistant	409
Storekeeper, junior	409
Storekeeper, under	409
Storekeeper	414
Operator, passenger elevator	416
Operator, tabulating-machine	416
Custodian, assistant	417
Operator, elevator	417
Custodian, assistant	418
Engineman, chief	418
Operator, elevator	418
Operator, passenger elevator	418
Architect	501
Architect, junior	501
Checker, under	502
Custodian, assistant	504
Guard, captain	504
Janitor	504
Laborers' foreman	504
Lampist	504
Operator, elevator	504
Superintendent, motor vehicles	504
Supervisor	504
Laborers' foreman	505
Operator, elevator	505
Superintendent, motor vehicles	505
Supervisor	505
Chief, supplies	506
Custodian, assistant	506
Operator, elevator	506

Another way of processing the completed and coded forms (Figures 1a and 1b) has been to list all jobs which are suitable for workers with a specific disability, as in this instance for disability code number 01—Positions Suitable for Persons with Amputation of One Arm.

Figure 2a.

Probable suitability of occupations in ship, boat, and submarine building is indicated by the symbol "X" for individuals having any one of the following types of physical disability. The symbol "O" indicates that extremely careful appraisal must be given, in this instance, to the physical demands of the specific job and the limitations of the particular individual being considered for placement.

A—Loss of One Thumb and One Finger of Either Hand.
B—Loss or Complete Impairment of One Hand or Arm.
C—Fallen Arches and Flat Feet, or Varicose Veins.
D—Leg Disabilities—Lame with Severe Limp, or One Leg Amputated above the Knee, or Cases in which Crutches are Used.
E—Hernias.
F—Severe Back or Spinal Injuries.
G—Gastric Ulcers or Abdominal Adhesions.
H—Heart Disease (Minor Cardiac Ailments).
J—Inactive Pulmonary Tuberculosis, Asthma, or Chronic Bronchitis.
K—Defective Vision (Not Total Blindness).
L—Dead-Mutism.

Occupational Code	Title	Disability										
		A	B	C	D	E	F	G	H	J	K	L
0–01. 20	Accountant, General	X	X	X	X	X	X	X	X	X	O	X
	Accountant, Chief	X	X	X	X	X	X	X	X	X	O	O
0–03. 30	Architect, Marine	X	X	X	X	X	X	X	X	X	O	O
0–07. 21	Chemist, Foundry	X	X	X	X	X	X	X	X	X	O	X
0–16. 01	Construction, Engineer	X	X	O	O	X	O	X	O	O	O	O
0–17. 01	Design Engineer, Electrical	X	X	X	X	X	X	X	X	X	O	X
0–19. 01	Marine Engineer I	X	X	X	X	X	X	X	X	X	O	O
0–19. 04	Sales Engineer	X	X	O	O	X	X	X	X	X	O	O
0–26. 10	Medical Examiner	X	O	X	X	X	X	X	O	O	O	O
0–33. 10	Nurse III	X	O	O	O	O	O	X	X	O	O	O
0–39. 82	Manager, Employment	X	X	X	X	X	X	X	X	O	O	O
0–48. 01	Draftsman, Ship Detail	X	X	X	X	X	X	X	X	X	O	X
0–48. 06	Draftsman, Commercial	X	X	X	X	X	X	X	X	X	O	X
0–48. 11	Draftsman, Electrical	X	X	X	X	X	X	X	X	X	O	X
0–48. 16	Draftsman, Marine	X	X	X	X	X	X	X	X	X	O	X
	Draftsman, Hull	X	X	X	X	X	X	X	X	X	O	X
	Draftsman, Ship Engineering	X	X	X	X	X	X	X	X	X	O	X
0–48. 18	Draftsman, Mechanical	X	X	X	X	X	X	X	X	X	O	X
0–48. 31	Tracer IV	X	X	X	X	X	X	X	X	X	O	X
0–56. 11	Photographer, Commercial	X	O	X	O	X	X	X	X	X	O	O
0–64. 30	Instrument Man III	O	O	O	O	X	O	X	O	O	O	O

This type of list has been compiled for all the occupations in an industry, in this case for ship, boat, and submarine building. The information has been taken from job analysis schedules prepared by job analysts and classified according to the 11 disability code letters shown above.

RELIABILITY: The common way for determining the reliability of ratings is to compute the correlation between the results of two raters—of two job analysts for physical demands analysis, of two physicians for physical capacities analysis, and of two placement officers for their matching of capacities with demands. In this manner the strong and weak links in the selective placement process may be indicated.

VALIDITY: It should be remembered, however, that high reliability of measurement in and of itself is not a primary requirement of a good measuring device. The primary consideration on which a measuring device is to be judged is its validity, that is, how well it measures what it is supposed to measure—how well it measures the physical capacities of workers and the physical demands of jobs in order to achieve the successful and safe matching of the physical characteristics of workers and jobs. An instrument which is high in reliability but low in validity is not as good as one which is only moderately high in both reliability and validity. The reliability of a measuring device, however, sets an upper limit to its possible validity. An instrument which is very unreliable can only have a low degree of validity. On the other hand, an instrument which is highly reliable may be, but not necessarily, also highly valid. Increasing the reliability of a measuring device often increases its validity but does not always do so. Thus reliability of measurement is only important insofar as it affects validity, validity being the important consideration.

Figure 3.

APPROVED FACTORY JOBS FOR THE PHYSICALLY HANDICAPPED

DISABILITY "J"—INACTIVE TUBERCULOSIS, ASTHMA, CHRONIC BRONCHITIS

The following jobs have been approved for the disability indicated above:

Code	Title	Departments
144A	Tool Follow-up Man	6, 7
314A	Small Tools Repairman—Maintenance	28
B	Small Tools Repairman—Maintenance	28
416A	Special Equipment Mechanic	21
B	Special Equipment Mechanic	21
587A	Parts Handler	18
505A	Tool Maker	6, 14, 29
B	Tool Maker	6, 14, 29
542A	Die Maker	17
B	Die Maker	17
543A	Template Maker—Flat Layout	26, 55
B	Template Maker—Flat Layout	26, 55
553A	Jig Builder	21
B	Jig Builder	21
C	Jig Builder	21
531A	Form Block Maker	32
B	Form Block Maker	32

This type of list has been prepared for all the jobs in a specific factory. The information has been based upon the unanimous opinion of industrial physician, safety engineer, personnel officer, industrial relations representative, and factory superintendents and foremen. The same disability code letters appear as shown in Figure 2a, in this case for disability "J"—Inactive Tuberculosis, Asthma, Chronic Bronchitis.

Figure 2b.

ARC WELDER AND RELATED OCCUPATIONS SUITABLE FOR INDIVIDUALS WITH LOSS OR COMPLETE DISABILITY OF ONE HAND

Table I

Skilled Arc Welder and Other Welding Occupations Requiring Knowledge of and Ability in Arc Welding, and Suitable for Individuals With Loss or Complete Disability of One Hand

Occupational code	Title	Industry In Which Found
4–85.010	Welder Leadman	any ind.
4–85.020	Welder, Arc	auto. mfg.; any ind.
4–85.040	Welder, Combination	struct. & ornam. metal work; refrigerat. equip.; any ind.
	Welder, Jig Frame	aircraft mfg.
	Welder, Experimental	refrigerat. equip.

Table II

Related Welding Occupations

Semiskilled Arc Welders, and Welding Occupations Involving Methods Other Than Electric Arc, and Suitable for Individuals With Loss or Complete Disability of One Hand

Occupational code	Title	Industry in Which Found
4–85.030	Welder, Acetylene	any ind.
4–85.060	Welder, Atomic	any ind.
4–85.310	Brazer	any ind.
6–85.010	Welder, Bar	any ind.; auto. mfg.
6–85.020	Welder, Butt	any ind.
6–85.030	Welder, Flash	auto. mfg.; any ind.
	Welder, Projection	refrigerat. equip.
6–85.060	Welder, Spot	any ind.
	Panel Maker	struct. & ornam. metal work
6–85.070	Welder, Thermite	any ind.

This type of list has been compiled on the basis of the skill relationship of other jobs to a specific job, in this case for arc welder and related occupations, and also on the basis of specific disabilities, in this case for one-handed workers. The information has been taken from job analysis schedules prepared by job anaylsts.

ADVANTAGES: (1) *Rating scale approaches* overcome several disadvantages of disability lists in that they deal with the worker's capacities rather than his handicaps and therefore do not tend to consider all workers with the same handicap as being incapacitated to the same degree nor to restrict the work opportunities of disabled workers by identifying them with a specific list of jobs.

2. Another advantage claimed for rating scales is simplicity—that the forms for both worker and job may be easily and quickly prepared and easily and quickly matched.

3. Rating scale approaches are also claimed to "work."

DISADVANTAGES: (1) A major disadvantage of rating scale approaches is that they are necessarily subjective. This is true because it has been found impossible up to this time to prepare reliable definitions of the physical factors which will allow for the inherent elements of *time* and *intensity* in physical activities. For instance, with the poundage lifted representing *intensity*, and the duration for which it is lifted representing *time*, consider the following definition of *lifting* which is probably one of the best rating scale definitions yet developed for the physical factor of *lifting:*

"(In this definition, "occasional means requiring 1/3 or

Figure 4.
Employer Survey Committee Form

COMPANY DEPARTMENT DATE

MEMBER	LOSS	CLERICAL *S.	CLERICAL S-S.	CLERICAL U-S.	TRADE S.	TRADE S-S.	TRADE U-S.	MANUFACTURING S.	MANUFACTURING S-S.	MANUFACTURING U-S.	SERVICE S.	SERVICE S-S.	SERVICE U-S.	OTHER S.	OTHER S-S.	OTHER U-S.
SIGHT	PARTIAL															
	TOTAL															
HEARING	PARTIAL															
	TOTAL															
LEGS	PARTIAL															
	TOTAL															
FEET	PARTIAL															
	TOTAL															
HANDS	PARTIAL															
	TOTAL															
ARMS	PARTIAL															
	TOTAL															
HEART DISEASE																
BACK CONDITION																
OTHER ORGANIC DISABILITIES																
TOTAL NO. OF JOBS THAT ABOVE PEOPLE COULD DO																

* S.—Skilled S-S.—Semi-skilled U-S.—Unskilled

This form has been prepared for use by an employer survey committee to canvass the jobs in a community and determine the suitability of the jobs for workers with the various disabilities indicated in the form.

less of the work period, "intermittent" means 1/3 to 2/3, and "sustained" means more than 2/3.)

"*Lifting*—Raising or lowering an object from one level to another.

"Little—Occasional or intermittent lifting of objects weighing 15 pounds or less; or occasional lifting of objects weighing 15 to 40 pounds.

"Moderate—Intermittent lifting of objects weighing 15 to 40 pounds; or sustained lifting of objects weighing 15 pounds or less.

"Great—Any lifting of objects weighing more than 40 pounds; or sustained lifting of objects weighing 15 to 40 pounds."

According to this definition a few of the possible inconsistent ratings may be indicated as follows:

(a) Lifting 40 pounds for the full work period would be rated as *great*, while lifting 50 pounds once a day would also be rated as *great*.

(b) Lifting 40 pounds for 65% of the work period would be rated as *moderate*, while lifting 15 pounds for 75% of the work period would be rated as *great*.

(c) Lifting 15 pounds for 65% of the work period could be rated as either *little* or *moderate*.

(d) Lifting 15 pounds for 75% of the work period could be rated as either *moderate* or *great*.

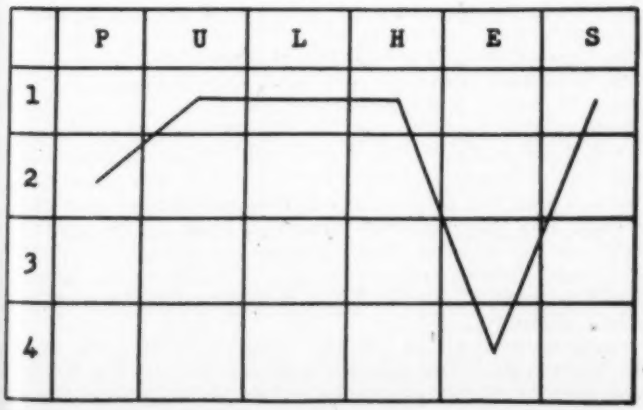
While the terms *little*, *moderate*, and *great* have been used in this definition, it is to be pointed out that the same inconsistencies and subjective difficulties would be encountered when preparing definitions for other discrete categories such as A, B, C, D or 1, 2, 3, 4.

2. Owing to the subjective nature of rating scale approaches such plans have a low degree of reliability and a low degree of validity. Claims made to the effect that they are good because they "work" are usually founded on the fact that they are claimed to "work" only because they are "used." Because a plan is "used" does not necessarily mean that it "works." Organizations using rating scale plans have yet to produce the evidence that such plans are reliable and valid.

For rating scale plans, the judgments of job analysts on the same job have been correlated many times, yielding coefficients of reliability as low as 0.30; and the judgments of physicians on the same worker have been correlated many times, sometimes indicating no reliability at all. While rating scale plans are possibly better than disability lists, they have not as yet been shown to be a worth while placement tool for matching the physical characteristics of workers and jobs.

3. Claims of simplicity for rating scale plans may be questioned on the grounds that other plans which are presented later have greater simplicity.

Figure 5.



IV. Rating Scales with Disability Information

THE plans presented in this Chapter combine disability lists (discussed in Chapter II) with rating scale approaches (discussed in Chapter III). These plans have all the advantages and disadvantages listed in Chapters II and III.

An ideal example of a physical demands analysis rating scale which also gives disability information is shown in Fig. 8. On the one hand, 32 physical demands of jobs are rated according to a 3-point scale: + meaning a high demand, O meaning ordinary, and — meaning a negligible demand. On the other hand, 28 physical handicaps are marked *yes* or *no* according to the disabilities the job will allow a worker to have. The latter information is the equivalent of listing jobs according to disabilities.

In Figs. 9a and 9b another plan is shown which combines rating scale and disability information. Jobs are first analyzed by using the form shown in Fig. 9a. The job information is then coded according to the letter and number codes shown in Fig. 9b. Fig. 9b is also used to code the physical fitness of workers. The matching process then takes place on the basis of matching code letters and numbers. For instance, a worker with a code of C-3-14 could be placed on a job with a code of C-1-2-3-7-10-14-16, that is, the worker matches the job when his code letter is the equivalent of, or better than, the code letter of the job, and when his code numbers are to be found in the code numbers of the job.

V. Modified Rating Scales

THEORY: The plans presented in this Chapter are based on the belief that rating scales in themselves are some-

what nebulous and that in order to have meaning rating scales need modification. For instance, a job or a worker may have a C rating (light labor). This C rating alone, however, is not thought to be clear enough for satisfactory placement purposes. What makes the job a C job? Is it because the job does not require climbing, sustained standing, heavy lifting, or what? And what makes the worker a C worker? Is it because he cannot climb, stand all day, lift heavy objects, or what? It is believed, therefore, that the A, B, C, or D rating of job and worker is not sufficient in itself. If good placements are to result the ratings need to be modified in order to point out why the job and worker has an A, B, C, or D rating. The methods used for modifying rating scales are best understood by reviewing the examples themselves.

Figure 6a.

Job Title _____ Schedule No. _____

Physical Activities	None	Little	Moderate	Great	*Physical Demands Form* Comments
1. Walking					
2. Standing					
3. Sitting					
4. Bending					
5. Reaching					
6. Lifting					
7. Pushing or Pulling					
8. Handling					
9. Fingering					
10. Talking					
11. Seeing					
12. Hearing					
13.					
14.					
15.					
16.					
17.					
Working Conditions					
51. Inside					
52. Outside					
53. Hot					
54. Cold					
55. Humid					
56. Wet					
57. Dusty					
58. Oily					
59. Odors					
60. Noisy					
61. Toxic Conditions					
62. Burns					
63. Bodily Injury					
64.					
65.					
66.					
67.					
68.					

Other *Physical Activities* which it may be necessary to rate:

Carrying	Depth Perception	Touch
Climbing	Jumping	Turning
Color Vision	Throwing	

Other *Working Conditions* which it may be necessary to rate:

Cramped	Falls	Radiant Energy
Dirty	High	Sudden Temperature Changes
Disease Infections	Silica Dust	Vibration
Dry	Lighting	
Electric Shock	Pressure	
Explosions		

This form is representative of several plans which use the pure type of rating scale to analyze the individual physical and environmental factors of jobs. This form may be adjusted for use by the industrial physician to analyze the individual physical capacities of workers.

REPRESENTATIVE EXAMPLES: A good example of a rating scale with modifications for the classification of both worker and job is shown in Fig. 10. In analyzing either the worker or the job the various items are checked as required. This process results in both worker and job receiving a code, such as C-11-22-31-40-50-52-130. The worker and job are then brought together by matching respective code letters and numbers.

The form shown in Fig. 11 is a modified rating scale which has been designed for use by the industrial physician to transmit information on the worker's physical qualifications to the department supervisor. The supervisor is required to give a description of the job assigned on the bottom section of the form and return it to the physician. This feature provides the physician with an opportunity to check the nature of the assignment.

ADVANTAGES AND DISADVANTAGES: When first reviewing these plans they may give the impression of being quite concrete and specific. On closer examination, however, it may be seen that in truth they are rating scales modified by rating scales.

First of all, one should not be misled by the specific nature of the *environmental factors*, such as, "No exposure to: dusts, fumes, moving machinery, traffic, excessive noise, and excessive heat." From the practical viewpoint this specific nature of environmental factors is true of *all plans*. A worker either can or cannot be exposed to an environmental factor. For instance, a worker who suffers from dizziness is not allowed to work on *high places* for part of the work period; he is, rather, not allowed to work on *high places at* all. It is therefore the *physical* (rather than environmental) *factors* of these plans which require examination.

In Fig. 10, the A, B, C, D ratings are modified by physical factors which also are arranged according to a scale. For example, *standing:* "(item 10) No standing, (11) Standing less than 50% of the time, and (12) Standing more than 50% but not all of the time." Similar scales are used for the other physical factors in this plan.

Are the various scales used in Fig. 10 superior to the scale of "none, little, moderate, and great" used in Chapter III? Certainly the scale of "none, little (up to 1/3), moderate (1/3 to 2/3), and great (over 2/3)" is more definite than the various scales used in Fig. 10. This becomes particularly evident when examining the treatment given the important factors of *lifting* and *carrying* in Fig. 10: "(50) No lifting or carrying, and (51) Moderate or less than moderate lifting and carrying."

In Fig. 11, only 10 of the 20 modifying items are physical factors (items 1, 2, 3, 4, 5, 6 (climbing), 9, 10, 11, and 14). The remaining 10 modifying items are environmental factors to which a worker either can or cannot be exposed. The physical factors of this plan also are arranged according to a scale although in a more subtle manner. For example, *lifting:* "Not to be assigned to a job requiring: (item 2) Heavy lifting, and (3) Any lifting." In this case, when the physician checks item 2, "Not to be assigned to a job requiring heavy lifting," he is saying in effect that the worker may lift something which is not heavy. In other words, this plan actually uses a hidden 3-point rating scale for *lifting:* (a) heavy lifting, (b) some lifting, but not heavy lifting, and (c) no lifting. Here again, would not the scale of "none, little, moderate, and great" be more explicit?

Another example of a hidden 3-point rating scale used in Fig. 11 involves *walking* and *standing:* "Not to be assigned to a job requiring: (item 1) Anything other than bench work, and (5) Continuous walking or stand-

ing." When the physician checks item 5, "Not to be assigned to a job requiring continuous walking or standing," he is saying in effect that the worker may walk and stand part of the time. This completes the 3-point scale for *walking* and *standing:* (a) all the time (when items 1 and 5 are not checked), (b) part of the time (when item 5 is checked), and (c) not at all (when item 1 is checked). Certainly the "none, little, moderate, and great" rating scale would be more intelligible.

It may appear that the attempt is being made to advocate the use of the "none, little, moderate, and great" rating scale discussed in Chapter III. This is not the case. The attempt is being made to point out that the plans discussed in this Chapter are akin to, but in no way superior to, those presented in Chapter III. The basic advantages and disadvantages of the plans in this Chapter, therefore, are primarily the advantages and disadvantages listed for the plans in Chapter III.

VI. Quasi Specific Approach

THEORY: The plan shown in Figs. 12a and 12b is representative of efforts within the past eighteen months to break away from the subjective nature of rating scale approaches. In theory this plan is based on a criticism of the plans previously discussed, believing that the disadvantages of the previous plans greatly overshadow their advantages. In attempting to overcome these disadvantages, this plan relies on the method of recording the facts objectively and specifically. For instance, it is believed that by stating that a job requires walking 40%, standing 40%, and sitting 20% of the work period, more specific information is provided than by stating that the job requires moderate walking, moderate standing, and little sitting. Furthermore, it is better to say that a worker can lift and carry up to 25 pounds than it is to say "no heavy lifting" or "moderate or less than moderate lifting and carrying."

EXAMPLES: Fig. 12a illustrates one method used in the specific approach for analyzing the physical and environmental requirements of jobs. The job analyst first checks the various factors as being either required or not required and then prepares descriptive paragraphs on the specific details of the physical and environmental requirements and hazards.

Fig. 12b is the companion piece to 12a and illustrates how the industrial physician presents his analysis of the worker's physical capacities. This form also provides for a return report from the placement officer in order that the physician may check the nature of the assignment. The diagnosis is kept confidential, but for Charles B. Jones is: "Rheumatic heart disease with mitral stenosis. Enlarged right ventricle. Compensated. Class II C." It is to be noted that the physical capacities of Jones satisfy the physical and environmental requirements of the job shown in Fig. 12a.

Figure 6b.

SPECIAL AID FOR PLACING MILITARY PERSONNEL IN CIVILIAN JOBS

DENTAL TECHNICIAN 855

Assists Dental Officer in rendering routine dental service.

Sterilizes and lays out instruments and medical supplies. Mixes dental cement and amalgams for fillings, maintaining proper consistency and proportions. Prepares hypodermic syringes and other medicines as necessary.

May scale and polish teeth, using dentist's drill fitted with cleaning brushes. May apply medication to tooth to ease pain in the absence of Dental Officer. May assist in taking and developing X-ray photographs of defective teeth.

Should be familiar with nomenclature, medications and preparations, and equipment used in dental clinic.

Completion of dental technician's course at an Army school or equivalent civilian or military training and experience required.

Note: Scaling and polishing teeth aspect of job to be governed by local or State regulations of area where placement is made.

Related civilian occupations	Additional training required	Physical activities	Working conditions
1-32.10 DENTIST'S ASSISTANT 1-32.20 PHYSICIAN'S ASSISTANT	No additional training	Great: Fingering, seeing Moderate: Handling, reaching, bending, talking, hearing. Little: Walking, standing, sitting, color vision.	Great: Inside. Little: Wet, humid, odors, disease infections.
2-38.10 FIRST-AID ATTENDANT 2-38.20 NURSE, PRACTICAL. 2-42.10 ORDERLY. 2-42.30 ASYLUM ATTENDANT. 2-42.60 VETERINARY-HOSPITAL ATTENDANT.	Brief on-the-job training in other non-professional medical service jobs involving first-aid treatment, and administration of drugs, or other treatment under supervision.	Great: Lifting, carrying. Moderate: Handling, reaching, pushing or pulling, fingering. Little: Walking, standing, talking, seeing, hearing, turning.	Moderate: Inside. Little: Bodily injury, disease infections, odors.
1-25.92 RECORDAK OPERATOR 5-86.310 PHOTOSTAT OPERATOR. 7-86.310 PHOTO-MACHINE OPERATOR MINIATURE. 7-86.330 BLUEPRINTING-MACHINE OPERATOR I. 7-86.340 BLUEPRINTING-MACHINE OPERATOR II. 7-86.350 PHOTOLITH OPERATOR.	Training to learn to operate simple photographic equipment.	Great: Fingering, seeing, depth perception. Moderate: Touch, handling, standing. Little: Color vision, walking, bending.	Great: Lighting, inside. Moderate: Odors. Little: Wet.
4-52.472 MIXER OPERATOR VIII 4-53.011 MIXER, HAND. 6-41.240 CLAY MAN. 6-52.411 MIXER OPERATOR II. 6-53.012 MIXING-MACHINE OPERATOR I. 6-55.320 CLAY-PLANT TREATER. 6-57.017 CEMENT MIXER II. 6-66.012 CLAY MAKER. 6-66.013 PUG-MILL OPERATOR I. 6-66.051 GLAZE MAKER I. 6-66.116 MOLDER, HAND I. 6-66.451 BATTER-OUT I. 6-67.070 MIXER TENDER I.	Training in techniques of weighing, measuring, or mixing by hand or machine various elements to make products such as rubber, explosives, drugs and cement; or training to operate simple machines to make clay or clay products.	Great: Handling Moderate: Standing, bending, reaching. Little: Pushing or pulling, walking, color vision.	Great: Inside. Little: Wet, dirty.
0-50.04 X-RAY TECHNICIAN I 0-60.06 DENTAL TECHNICIAN. 0-50.07 DENTAL HYGIENIST. 0-50.22 CHEMIST, ASSISTANT II. 0-50.40 X-RAY TECHNICIAN II.	Considerable training in various techniques employed in dental mechanics or therapy; or training in the operation of x-ray machines for various purposes involving thorough knowledge of machine and object x-rayed; or training in chemistry and laboratory techniques.	Great: Fingering, seeing Moderate: Sitting, standing, talking. Little: Walking, bending, reaching, lifting, pushing or pulling.	Great: Inside. Little: Wet, radiant energy.

One way of processing the information secured in Figure 6a has been to show the physical and environmental requirements in conjunction with the skill relationship of jobs as illustrated here.

Fig. 12c is shown to illustrate a form which is highly similar to 12b. Either may be used by the industrial physician.

Fig. 13 represents another plan which has been used to classify both workers and jobs. This plan is very simple and only attempts to cover seven major factors, two of which are physical and five environmental. This plan is specific in that these seven factors are usually either required or not required by jobs, may or may not be done by workers.

Arbitrary standards may be set for "Class II—No Heavy Lifting," such as, "not over 25 pounds," and for "Class VI—No Extensive Walking or Standing," such as, "not over half the time."

ADVANTAGES AND DISADVANTAGES: The plans presented in this Chapter have been called quasi specific approaches due to the fact that part is specific (physical demands analysis) and part is a rating scale (physical capacities analysis). Because of this variation the advantages and disadvantages of the forms shown are discussed separately.

Figure 7a.

SUMMARY OF OPERATION REQUIREMENTS

Operation Title_____ Operation No._____

Date_____

| | | |

Figure 7b.

SUMMARY OF PLACEMENT QUALIFICATIONS

Name_____ Key No._____

By_____ Date_____

1 EYES	VISION				PERMITTED APPLICATION				CORRECTION	
					CLOSE		1-7 Normal	1-8 Slight	1-9 With	
	1-1 Clear	1-2 Average	1-3 Very Little	1-4 None	1-5 Continuous	1-6 Intermittent			1-10 Without	
2 EARS (HEARING)	2-1 Excellent		2-2 Average		2-3 Very Little		2-4 None			
3 HANDS	USE OF HANDS			FINGER DEXTERITY			GRIPPING			FOREARM & WRIST	
	3-1 Both	3-2 Right	3-3 Left	3-4 Great	3-5 Normal	3-6 Slight		Light	Strong	R	L
							Constant	3-7	3-9	3-11	3-13
							Occasional	3-8	3-10	3-12	3-14
4 FEET Artificial Limb	USE OF FEET				WALKING						
	4-1 Both		4-2 Left		4-3 Right		4-4 Neither	4-5 Unlimited		4-6 Limited	4-7 None
5 HEIGHT and WEIGHT	HEIGHT				WEIGHT						
	5-1 Tall		5-2 Average		5-3 Short			5-4			
6 LIFTING PERMITTED	6-1 Under 10 lbs.	6-2 Over 10 lbs.	6-3 Over 20 lbs.	6-4 Over 30 lbs.	6-5 Over 40 lbs.	6-6 Over 50 lbs.	6-7 Over 60 lbs.	6-8 Over 70 lbs.	6-9 Over 80 lbs.	6-10 Over 90 lbs.	6-11 Over 100 lbs.	6-12 Frequently Times per Hr.	6-13 Infrequently Times per Hr.

7 POSTURE PERMITTED	MUST SIT		REACHING ABOVE SHOULDER		STOOPING	
	7-1 All the Time		7-4 Frequently		7-7 Frequently	
	7-2 Part Time		7-5 Occasionally		7-8 Occasionally	
	7-3 None		7-6 None		7-9 Never	

8 WORK STATION CONDITIONS PERMITTED	8-1 Inside	8-2 Outside	8-3 In & Out	8-4 Drafty	8-5 Dusty	TEMPERATURE		8-8 Dry	8-9 Splash	8-10 Continuous	8-11 Other
						8-6 Hot	8-7 Normal				

9 WORK STATION SURROUNDINGS PERMITTED	9-1 Loud Noise	9-2 Average Shop	9-3 Quiet	RELATION TO OTHER EMPLOYEES		9-7 Other
				Work as Member of Crew 9-4		
				Near Others but Ind. 9-5		
				Work in Isolated Station 9-6		

10 OPERATION HAZARDS PERMITTED	MOVING MACHINERY			10-4 Soldering Fluxes	10-5 Acids	10-6 Molten Metal	10-7 Height	10-8 Oil	10-9 Other
	10-1 Presses	10-2 Saws	10-3 Other						

11 PROTECTION A–ALLOWED R–REQUIRED P–PROHIBITED	FOR EYES		FOR HANDS		FOR FEET		FOR BODY	
	11-1 Eye Shield		11-7 Canvas Gloves		11-13 Rubbers		11-19 Cloth Apron	
	11-2 Plain Goggles		11-8 Leather Gloves		11-14 Boots		11-20 Water-Proof Apron	
	11-3 Tinted Goggles		11-9 Rubber Gloves		11-15 Safety Shoes		11-21 Leggings	
	11-4 Welding Helmet		11-10 Asbestos		11-16 Safety Toes		11-22 Other	
	11-5 Other		11-11 Other		11-17 Other		11-23 Optional	
	11-6 Optional		11-12 Optional		11-18 Optional			

Remarks:_____

This form for measuring the physical capacities of workers is based on the identical design of that shown in Figure 7a for measuring the physical requirements of jobs. This feature facilitates the matching of worker and job.

Figure 8.

JOB ANALYSIS RATING SCALE WITH DISABILITY INFORMATION

PHYSICAL DEMANDS OF JOB		STANDARD PHYSICAL HANDICAPS	
Rate: + = High Demand O = Ordinary Demand − = Negligible Demand		Rate: N = No Y = Yes	
1	Agility	1	Arm (Right) Off Below Elbow
2	Balancing	2	Arm (Left) Off Below Elbow
3	Carrying	3	Arm (Right) Off Above Elbow
4	Climbing	4	Arm (Left) Off Above Elbow
5	Crawling	5	Arm (Right) Disabled
6	Crouching	6	Arm (Left) Disabled
7	Dampness	7	Cardiac
8	Eye Risk	8	Deafness-Partial
9	Feeling	9	Deafness-Total
10	Fingering	10	Deaf Mute
11	Grip-Firm	11	Hand (Right) Disabled
12	Handling	12	Hand (Left) Disabled
13	Hearing	13	Hand (Right) Mutilated
14	Jumping	14	Hand (Left) Mutilated
15	Kneeling	15	Hernia
16	Lighting	16	Leg (Right) Off Below Knee
17	Lung Risk	17	Leg (Left) Off Below Knee
18	Pulling	18	Leg (Right) Off Above Knee
19	Pushing	19	Leg (Left) Off Above Knee
20	Reading	20	Leg (Right) Disabled
21	Running	21	Leg (Left) Disabled
22	Seeing	22	Leg (Both) Disabled
23	Sitting	23	Leg (Both) Off Below Knee
24	Standing	24	Leg (Both) Off Above Knee
25	Stooping	25	Leg (One) Shorter Than Other
26	Talking	26	Tuberculosis (Arrested Pulmonary)
27	Throwing	27	Varicose Veins
28	Turning	28	Vision-One Eye
29	Vision-Color		
30	Vision-Depth		
31	Walking		
32	Working Speed		

This physical demands analysis from rates 32 physical demands and also provides information as to whether or not a job may be performed by workers with any one or combination of 28 physical handicaps.

ADVANTAGES OF FIG. 12A: (1) The major advantage of this physical demands analysis approach is that by being specific in nature it attempts to overcome the disadvantages of job analysis approaches discussed in the previous Chapters. First, it is not primarily designed to record information for the purpose of compiling lists of jobs suitable for the physical handicapped. The information presented, however, could be coded according to the disabilities the job would allow and presented in the form of disability lists if desired. Secondly, the approach does not use a rating scale to record the physical and environmental requirements of jobs. It is therefore believed that it does eliminate the principal disadvantages of the previous plans and that it does establish a more objective and specific approach in that it attempts to record the facts.

2. When pre-placement physical examinations are given and when workers are being hired for specific jobs, the industrial physician may be greatly aided by referring to the physical demands analysis of the specific job for which the worker is being hired in order to decide whether or not the worker's physical capacities are suited to the physical and environmental demands of the specific job. Also, in deciding whether or not a worker needs a job transfer as a result of illness or injury, the physician may find it helpful to refer to the physical demands analysis of the worker's present job.

DISADVANTAGES OF FIG. 12A: (1) This approach requires a great deal of time for the training of job analysts. The descriptive details are difficult to write and usually require several rewritings. In one extensive experience it took three months to select and train 10 job analysts and an additional three months for the 10 analysts to analyze the jobs in the plant and prepare approximately 400 physical demands analyses. This means that it took six months time for one job analyst to become trained and prepare 40 schedules. After this basic material is once prepared for one plant, however, it is then a relatively simple matter to verify the analyses in other plants in the same industry.

2. Not only is the information difficult to prepare but it is also none too easy to understand. In an effort to describe the association of activities required by the job, the analyst groups several factors in one sentence. Any one of the factors, such as *standing* or *lifting*, may appear in any one or all of the sentences in the paragraph. As an illustration for *lifting* and *carrying*, in one sentence at the beginning of the paragraph the job may require the worker to lift and carry 25 pounds up to 75 feet for 10% of the work period, and in another sentence later on the worker may again be required to lift and carry 50 pounds up to 25 feet for 5% of the work period. The physician or placement officer, therefore, is required to read the entire paragraph and to calculate the over-all time and intensity for any particular factor or factors in which he may be interested because of their bearing on the capacities of a particular worker.

3. This form is not well designed to show whether or not the activities of the job require one hand or two hands, one leg or two legs. When but one hand or one leg is required by the job it is necessary to make a note to this effect as shown in Fig. 12a.

4. Considerable space is devoted to the specific details of the hazards encountered on the job and tends to give the impression that the worker's life and limb are constantly at stake. There is probably no great advantage in showing such information at all since most hazards are self-evident and require no elaboration when the working conditions are indicated. For example, when it is indicated that the job requires the worker to work on *high places* it could very well go without saying that there is a possibility of the worker falling and becoming injured; and when the job requires work with *hazardous machinery* it is self-evident that the worker has a possibility of suffering injuries.

5. Each job analysis requires a full page and therefore a complete analysis of the jobs in a sizeable plant requires the arrangement and careful indexing of the analyses to form a sizeable volume. As is often true of bulky data which requires careful and thoughtful use, the tendency arises not to use such material.

FIG. 12B: The basic advantages and disadvantages of this form are primarily those listed in Chapter III for rating scale approaches. With the exception of the treatment given *lifting*, *carrying*, *pushing*, and *pulling*, which attempts to be specific, the remaining physical factors are dealt with according to a rating scale of thirds: (a) none, or no capacity when the factor is marked with an 0, (b) up to 1/3 of the work period, (c) between 1/3 and 2/3 of the work period, and (d) over 2/3 when the factor is left blank. This is practically the exact equivalent of dealing with these factors according to the scale of "none, little, moderate, and great."

In connection with the environmental factors in Fig. 12b, it was pointed out in Chapter V that from the practical viewpoint a worker either can or cannot be exposed to an environmental factor. This specific nature of environmental factors is true for this form as it is for all plans. In the case of items "(58) Toxic Conditions," and "(59) Radiant Energy," however, the physician is required to make brief comments, such as, "Should not handle solvents," and, "Should not work near welding arcs." Items 58 and 59 are general factors in this form and therefore require such specific comment. The point at hand, however, is that since environmental factors are usually specific, this plan nevertheless has the basic advantages and disadvantages listed in Chapter III since this plan treats the physical factors according to a rating scale of thirds.

FIG. 12C: This form is very similar to the one shown in Fig. 12b and has the same basic advantages and disadvantages. While it does not use a rating scale of thirds and leaves the details blank for the physician to fill out in longhand, it does use words which are the equivalent of using rating scales but which are not as explicit as a rating scale of thirds. To illustrate, in Fig. 12c such words as "prolonged," "occasional," and "strenuous" are used. If a worker "should avoid *prolonged* walking and standing," then for how long a period is he able to walk and stand? Such words as these only beg for definition, such

Figure 9a.

Date_____ JOB SURVEY OF PHYSICAL FACTORS Shift_____

Plant No._____ Dept. No._____ Name of Department_____ Section or Division_____ General Foreman_____ Foreman_____

JOB TITLE	PHYSICAL CODE No.	Is a man absolutely necessary?	Do You Consider Work to be				Eye-sight Required			Are Eye Hazards Present?	Hearing Required			Does Job Require					Can the Following People be Used										ARE HANDICAPPED PEOPLE USED?
			Heavy	Moderately Heavy	Light	Very Light	Good	Fair	Poor Permissible		Good	Fair	Poor Permissible	100% Standing	100% Sitting	Partial standing and partial sitting?	Any climbing?	Working in cramped position?	Elderly Man?	Elderly Women?	One Armed Workers?	Partial limitation in one hand?	One legged workers?	Blind workers	Deaf Mute	Worker with nervous instability?	Worker with poor coordination?	Worker with sensitive skin?		

Figure 10.

RATING SCALE WITH MODIFICATIONS FOR CLASSIFICATION OF BOTH WORKER AND JOB

RATING SCALE LETTERS

A—Heavy sustained labor. B—Moderately heavy labor. C—Light labor. D—Very light labor.

MODIFICATION CODE NUMBERS

1—New hire is not physically qualified.

2—Hernia statement advised.

General Functions

10—No standing.
11—Standing less than 50% of the time.
12—Standing more than 50% but not all of the time.
20—No sitting.
21—Sitting less than 50% of the time.
22—Sitting more than 50% but not all of the time.
30—No walking.
31—Walking less than 50% of the time.
32—Walking more than 50% but not all of the time.
40—No climbing.
41—Climbing less than 50% of the time.
42—Climbing more than 50% but not all of the time.
50—No lifting or carrying.
51—Moderate or less than moderate lifting or carrying.
52—No pushing or pulling.
53—Moderate or less than moderate pushing or pulling.
60—No stooping.
61—Stooping less than 50% of the time.
62—Stooping more than 50% but not all of the time.

Special Senses

70—No near vision.
71—Some but not good near vision.
73—Some but not good distance vision.
74—No binocular vision.
75—Some but not good binocular vision.
76—No color perception.
77—Vision in one eye only.
80—No hearing.
81—Some but not good hearing.

Specific Functions

90—No use of right hand or arm.
91—Partial use of right hand or arm.
100—No use of left hand or arm.
101—Partial use of left hand or arm.
110—No use of right foot or leg.
111—Partial use of right foot or leg.
120—No use of left foot or leg.
121—Partial use of left foot or leg.
130—Physical reactions not prompt.
135—No speech.

Environment

140—No danger from dizziness, fainting, or convulsions.
141—Nervous disorder (specify environmental limitations).
150—No exposure to dusts, smokes, fumes, vapors, gases, and mists.
151—No exposure to excessive noise.
152—No exposure to excessive heat.
153—No exposure to excessive cold.
160—No exposure to any skin irritants (particularly no wet jobs).
161—No exposure to specific skin irritants (specify).
170—Certain shift recommended (specify).

These code letters and numbers have been used to classify both worker and job, such as C-11-22-31-40-50-52-130. The worker and job are then brought together by matching the respective codes, that is, the worker matches the job when his code letter is the equivalent of, or better than, the code letter of the job, and when his code numbers are to be found in the code numbers of the job.

Paradoxically, however, the simplicity of Fig. 13 is one of its marked disadvantages. In attempting to reduce the number of items to a minimum, many important and often decisive factors are omitted. The only physical factors considered are *lifting*, *walking*, and *standing* (*climbing* is implied when a worker is not restricted to "Class III—Ground-Level Work Only"). But, in a comprehensive selective placement program, is it possible to ignore such physical factors as *vision*, *hearing*, *talking*, *fingering*, *handling*, *reaching*, *stooping*, *crouching*, *kneeling*, *crawling*, *twisting*, *reclining* and *carrying?* Likewise, the only environmental factors considered are *hazardous machinery*, *high places*, *dusts and fumes*, *skin irritants*, and *noise*. Again, is it possible to consider the problem of selective placement seriously by omitting such environmental factors as *inside*, *outside*, *temperature*, *moving objects*, *vibration*, *other toxic conditions*, and *wet quarters?*

VII. Specific Approach

HISTORY: During the last four months of 1944 the attempt was made in a field study to develop a selective placement system which would eliminate most of the shortcomings of previous approaches and at the same time provide a specific objective technique which would be quick and easy to use and which would have reliability and validity.

In this study, five days were spent in training two job analysts who then took an additional five days to analyze 25 jobs in a plant of 2,500 workers. The 25 jobs accounted for 85% of the workers. The two analysts worked independently and each one analyzed all of the 25 jobs. The results of their independent work on the form used (Fig. 14a) were compared and correlated, yielding a reliability coefficient of 0.90. Upon discussing their differences full agreement was reached. During the next two days all the data secured by the analysts was studied and arranged on a one-page master chart (Fig. 14b). Thus the plan was ready to put in operation after spending a total of 12 days in training the analysts and in securing and processing the data.

The next step was to instruct both the placement officers and plant physicians in the use of the data. This was simple and took one day. Placement officers were given a photostatic copy of the master chart and shown that the jobs were arranged alphabetically and numbered from 1 to 25. They were also given a supply of the "3 x 5 form" shown in Fig. 14c, "Physical Qualification Report," and instructed to enter on this form the applicant's name and the job number of the jobs for which there were openings and for which the applicant possessed the skills. They were then to send the applicant with the card to the plant physician in order to find out if the applicant was physically qualified for the jobs thus listed on the "3 x 5 form."

The two plant physicians were also given copies of the master chart and shown the "3 x 5 form." After examining the applicant the physician was to refer to the physical demands data on the master chart and decide whether or not the applicant had the capacities to meet the demands of the jobs for which the applicant was being considered. The physician was to check the "Yes" or "No" column after the job numbers on the "3 x 5 form" and return the applicant with the card to the placement officer serving the applicant. The placement officer would then know the job or jobs for which the applicant either was or was not physically qualified and could make the assignment according to the greatest need or according to the desires of the applicant.

It was also pointed out that when a worker was (or was not) physically qualified for a particular job, he then at least did (or did not) possess the physical capacities to meet the demands for that job as shown on the master chart, and, that if the need arose, this knowledge could be used in the future to transfer the worker to other jobs within the range of his capacities thus indicated. Also, in the event that the worker needed a job transfer as a result of illness or injury, the placement officer could then interview the worker to determine if he possessed the skills for jobs with lesser physical demands than his present job, and, if he did, the worker could be sent to the physician with a "3 x 5 form" to find out which of the easier jobs were suited to the worker's reduced capacities. Should the worker contact the physician first, then this information might be originated by the physician.

The effectiveness of this plan was studied during the first six weeks of operation. The two plant physicians both examined the first 100 applicants independently. As indicated by the "3 x 5 form" the results of the independent judgments of the two physicians were compared and found to conform in all but two cases which were resolved upon discussion. These physicians pointed out that this uniformity of judgment could be attributed largely to the fact that after examining the applicant it was relatively easy to decide whether or not the applicant could meet the physical demands of a job by referring to

Figure 11.

PHYSICAL QUALIFICATION PLACEMENT RECORD

Name | Badge No. | Date

1. This person is qualified for the following type of work:
☐ Arduous Work ☐ Moderate Work (Excluding severe manual labor) ☐ Light Work (Sedentary, or non-laborious type of work)

2. Limitations: Not to be assigned to a job requiring: (Indicate by hole punching)

1	Anything other than bench work.
2	Heavy lifting.
3	Any lifting.
4	Repeated bending.
5	Continuous walking or standing.
6	Work on ladders or overhead.
7	Exposure to dusts.
8	Exposure to chemical fumes.
9	Accurate far vision.
10	Accurate near vision.
11	Good hearing.
12	Work around moving machinery.
13	Exposure to dampness or chilling.
14	True color perception (color blindness).
15	Crane-truck operation.
16	Motor vehicle operation.
17	Operating feeding machines.
18	Work around traffic.
19	Exposure to solvents or greases.
20	Exposure to eye hazards.
21	

3. This person is qualified for work only after:
☐ a. Procuring properly fitted eyeglasses.
☐ b. Procuring properly fitted safety goggles.
☐ c. Procuring properly fitted truss.
☐ d. Other_____

☐ 4. It is recommended that this person not be employed on the basis of physical examination this date.

5. Remarks:_____

6. Disability Classification Code Number:

Signature of Examining Physician

(Detach)

(This card is to be completed by supervisor and returned to medical department upon assignment of employee.)

Name | Badge No. | Shift

Division | Section | Branch

Complete description of job assigned:

Signature of Supervisor

This form has been designed for use by the industrial physician to transmit information on the worker's physical qualifications to the department supervisor. The supervisor completes and returns the bottom section of the form to the physician, thus allowing the physician to check on the placement.

the specific requirements of that job on the master chart. These two physicians particularly admired the simplicity of the system and the almost effortless ease with which the form could be completed.

During this period of six weeks, 110 applicants were hired and placed on jobs in accordance with this plan. Of the 110 workers placed, not one worker left for physical reasons. During the immediate six weeks prior to this study when a plan similar to the one shown in Fig. 12a and 12b was being used, 10% of the workers left for physical reasons. Also, six months prior to this study when another plan which classified workers as being physically qualified for "arduous, moderate, and light work" was being used, as high as 17% of the workers left for physical reasons during a period of six weeks.

Owing to wage differentials, it is to be pointed out that this plant does not attract the average worker of the locality and it must rely on marginal workers. The big majority of these 110 workers, therefore, were true problems for selective placement because of age, ailments, and physical handicaps.

FIG. 14D: Also duing this period of study a form was developed which could be used by physicians in those plants where workers are hired for jobs in general and are not hired for specific jobs as in the plant studied. In such situations the physician does not have the opportunity of saying that the worker either is or is not physically qualified for a specific job. The physician is required, rather, to report the physical capacities of the worker in such a manner that they may be matched with jobs in general, either in the case of initial placement or job transfer.

The form developed for this purpose is shown in Fig. 14d, "Physical Capacities Analysis." The factors in the form are identical with those in the master chart so that the physician only needs to consider those factors which are required in the plant. To illustrate, if the plant has no *wet quarters*, then there is no need for the physician to be concerned over this factor. The form requires very little writing and its ruler-like shape makes it easy to compare capacities with demands by sliding the form up and down on the master chart.

Fig. 14d is as specific in nature as the physical demands data on the master chart. In this connection, however, it may be felt that it is impossible for the physician to be as specific with the physical capacities of workers as the analyst is with the physical demands of jobs; furthermore, that it is ridiculous even to try to calibrate physical capacities with such accuracy. While it is realized that little is known about determining physical capacities, it is to be made clear that this form actually provides far greater flexibility of opinion than other physical capacities forms which use discrete categories such as "0", up to 1/3, 1/3 to 2/3, and over 2/3."

In using Fig. 14d, if the physician believes that a worker has the capacity to perform an activity only 1/2 the time, then he marks that activity four hours; 1/4 the time, two hours; 3/4 the time, six hours; 1/3 the time, (approximately) three hours; and thus accordingly as his judgment dictates. He is free to say that a worker may perform an activity up to 0, 1, 2, 3, 4, 5, 6, 7, or 8 hours (or for fractions of an hour when the need arises so to restrict such activities as *climbing*). It is evident, therefore, that this method affords greater flexibility of opinion. The physician's judgment is in no way restricted and forced into the categories of a discrete scale. Also, paradoxically, while this method is more flexible, at the same time it yields more specific data.

While Fig. 14d itself does not provide for a return report on the assignment made by the placement officer, such a report could and should be cared for by designing a simple form which would show the number of the job to which the worker had been assigned. The physician would then be able to check the demands of the job assigned on the master chart in order to check on his analysis of the worker's physical capacities and thus make sure that the worker was not exceeding his capacities.

Fig. 14d has not as yet been tested in an actual situation. As illustrated in the example, however, it may be pointing in the direction of the future technique for specific physical capacities analysis.

The over-all plan for the system developed in this study is shown in Fig. 14a, 14b, 14c and 14d.

ADVANTAGES: (1) This plan is *positive*, dealing with abilities rather than disabilities; it considers each worker as an *individual* rather than as belonging to a group, such as able-bodied, one-armed, or deaf workers; and it is *objective* and *specific* rather than subjective and general. The plan is for the placement of all workers, each to his physical capacities.

Should it be desired to place individuals with specific disabilities according to the list technique, the data on

Figure 12a.

PHYSICAL DEMANDS ANALYSIS

Job Title *Welder, Arc, Production (Journeyman or Trainee)*
Job Location *Reclamation Shop*
Dictionary Title *Welder, Arc* Dictionary Code *4-85.020*

PHYSICAL FACTORS			
X	1 Lifting	O	15 Twisting
X	2 Carrying	O	16 Reclining
X	3 Handling[1]	X	17 Sitting
O	4 Pushing	X	18 Reaching
O	5 Pulling	O	19 Fingering
O	6 Climbing	O	20 Feeling
O	7 Jumping	O	21 Talking
O	8 Running	O	22 Hearing
X	9 Walking	X	23 Seeing
X	10 Standing	O	24 Color Vision
X	11 Stooping	O	25 Depth Perception
O	12 Crouching	O	26
O	13 Kneeling	O	27
O	14 Crawling	O	28

ENVIRONMENTAL FACTORS			
X	51 Inside	O	65 Vibration
O	52 Outside	O	66 Noise
*	53 High Temperature	O	67 High Places
*	54 Low Temperature	O	68 Cramped Quarters
O	55 Sudden Temp. Changes	O	69 Wet Quarters
*	56 High Humidity	X	70 Working With Others
*	57 Low Humidity	X	71 Working Around Others
X	58 Toxic Conditions	O	72 Working Alone
X	59 Radiant Energy	X	73 Day Shift
O	60 Moving Objects	X	74 Swing Shift
X	61 Mechanical Hazards	O	75 Graveyard Shift
X	62 Electrical Hazards	O	76
X	63 Exposure to Burns	O	77
O	64 Explosives	O	78

(X = Required by job. O = Not required by job. *See Weather Data.)

DETAILS OF PHYSICAL FACTORS: Stands and reaches forward into bin to grasp, lift and carry steel strips weighing up to 10 pounds about 10 feet to work bench (5%). Sits at bench 30 inches high and reaches forward to handle 1-pound electrode holder during welding process and to handle light wire brush and slag hammer while cleaning weld (90%). Stands, stoops and reaches down to handle controls to adjust electric generator (5%). Must be able to see 1/8-inch rod tip at 12 inches. No talking or hearing required. Physical factors similar on day and swing shifts.

DETAILS OF ENVIRONMENTAL FACTORS: Works day and swing shifts only, with and around others, inside Reclamation Shop (100%). Exposed to black-iron welding fumes (90%), to rays from electric welding arcs (100%), to sharp edges of materials (100%), to uninsulated parts of electrode holder (85%), and to hot metals and electric arcs (90%). Environmental factors similar on day and swing shifts.

DETAILS OF HAZARDS: Possibility of respiratory irritation from black-iron welding fumes (90%), of injury to the eyes from rays from electric welding arcs (100%)—(reduced by goggles and hood), of cuts from sharp edges of materials (100%)—(reduced by gloves), of electric shock from uninsulated parts of electrode holder (85%), and of burns from hot metals and electric arcs (90%)—(reduced by hood, gloves and leather garments). Hazards similar on day and swing shifts.

[1] Handling—One Arm: Welders with one artificial and one good arm can perform this job.

This form has been used by the job analyst in the specific approach to analyze the physical and environmental demands of jobs. In a form highly similar to this one, hours are sometimes used to represent time rather than percentages. The companion piece for the worker is shown in Figure 12b.

Figure 12b.

PHYSICAL CAPACITIES ANALYSIS

Name *Charles B. Jones* Sex *M* Age *42* Ht. *70* Wt. *178* Bade No. *1019*

PHYSICAL FACTORS			
√	1 Lifting		15 Twisting
√	2 Carrying	O	16 Reclining
	3 Handling		17 Sitting
√	4 Pushing		18 Reaching
√	5 Pulling		19 Fingering
O	6 Climbing		20 Feeling
O	7 Jumping		21 Talking
O	8 Running		22 Hearing
√	9 Walking		23 Seeing
√	10 Standing		24 Color Vision
√	11 Stooping		25 Depth Perception
√	12 Crouching		26
√	13 Kneeling		27
O	14 Crawling		28

ENVIRONMENTAL FACTORS			
	51 Inside		65 Vibration
O	52 Outside		66 Noise
	53 High Temperature		67 High Places
	54 Low Temperature		68 Cramped Quarters
O	55 Sudden Temp. Changes	O	69 Wet Quarters
	56 High Humidity		70 Working With Others
	57 Low Humidity		71 Working Around Others
	58 Toxic Conditions		72 Working Alone
	59 Radiant Energy		73 Day Shift
	60 Moving Objects	O	74 Swing Shift
	61 Mechanical Hazards	O	75 Graveyard Shift
	62 Electricl Hazards		76
	63 Exposure to Burns		77
	64 Explosives		78

(Blank space = Full capacity. √ = Partial capacity as qualified below. O = No capacity.)

DETAILS OF PHYSICAL FACTORS: May lift and carry up to *25* pounds *6* times per hour.
(Pushing and pulling effort not to exceed lifting and carrying effort.)

May intermittently climb up and down ramps, stairs, or ladders up to _____% of work period.

May engage in activities numbered _____ up to 2/3 of work period.

May engage in activities number *9, 10, 11, 12, 13* up to 1/3 of work period.

Sight: Hearing: Other:

DETAILS OF ENVIRONMENTAL FACTORS:

Date *12-5* 194 *4* Physician *Richard Roe* M. D.

(This space for record of Placement Officer)

New Job Assigned _____ Job Location _____ Shift _____

Remarks _____

Medical Dept. Notified _____ 194__ Signed _____

(To be completed by Placement Officer, detached, and returned to Medical Department)

Name _____ Badge No. _____

New Job Assigned _____ Job Location _____ Shift _____

Remarks _____ Date _____ 194__ Signed _____

This form has been used by the industrial physician to record the physical capacities of workers. The diagnosis is kept confidential, but for Charles B. Jones is: "Rheumatic heart disease with mitral stenosis. Enlarged right ventricle. Compensated. Class II C." The capacities of Jones satisfy the demands of the job shown in Figure 12a. This form also provides for a return report from the placement officer in order that the physician may check the nature of the assignment.

Figure 12c.

PHYSICAL CAPACITIES FORM

Name *Bob Smith* Sex *M* Age *29* Height *69* Weight *157*

PHYSICAL ACTIVITIES				WORKING CONDITIONS			
√ 1	Walking	16	Throwing	51	Inside	66	Mechanical Haz.
O 2	Jumping	√17	Pushing	52	Outside	67	Moving Objects
O 3	Running	√18	Pulling	53	Hot	68	Cramped Quarters
4	Balancing	19	Handling	54	Cold	69	High Places
√ 5	Climbing	20	Fingering	55	Sudden Temp. Ch.	70	Exposure to Burns
6	Crawling	21	Feeling	56	Humid	71	Electrical Haz.
√ 7	Standing	22	Talking	57	Dry	72	Explosives
8	Turning	23	Hearing	58	Wet	73	Radiant Energy
9	Stooping	24	Seeing	59	Dusty	74	Toxic Conditions
10	Crouching	25	Color Vision	60	Dirty	75	Work. With Others
11	Kneeling	26	Depth Per.	61	Odors	76	Work. Around Others
12	Sitting	27	Work. Speed	62	Noisy	77	Work. Alone
13	Reaching	28		63	Adequate Light.	78	
√14	Lifting	29		64	Adequate Vent.	79	
√15	Carrying	30		65	Vibration	80	

Black Space = Full Capacity. √ = Partial Capacity. O = No Capacity.

May work_____hours per day_____days per week. (If TB, cardiac or other disability requiring limited working hours.)

May lift or carry up to *35* pounds.

Details of limitations for specific physical activities: *Should avoid prolonged walking and standing. May climb short distances occasionally. Should not engage in strenuous pushing and pulling activities which involve the legs.*

Details of limitations for specific working conditions:_____

Date *October 18, 1944* Physician *C. A. Mills*, M. D.

This form has been designed for use by the industrial physician in a plan highly similar to that shown in Figures 12a and 12b.

the master chart (Fig. 14b) indirectly provides information which may be used for this purpose. For example, deaf-mute workers may be considered for those jobs which do not require *hearing* and *talking* as indicated in the columns for these factors.

2. Since this plan is objective it does not have the subjective pitfalls of rating scale approaches. It is not in the least concerned over trying to decide whether an activity should be rated A, B, C or D. It records the data objectively and specifically.

While it may be said that this plan does arrange *lifting* and *carrying* according to a scale, such as "1-5, 6-10, and 11-25 pounds," it is to be pointed out that the weights within these ranges do receive specific treatment in that the length of time these activities are required or may be performed is specifically recorded.

3. The plan is comprehensive and is designed to filter out the important physical and environmental requirements of the jobs in any plant.

4. For a comprehensive system it requires a minimum of time, effort, and expense to effect and maintain its operation.

5. It holds the writing effort down to a minimum for all concerned. The master chart in particular takes up little space and the requirements of 25 jobs may be shown clearly on one double-page. This method may be contrasted with other approaches which use a full page for each job such as is shown in Fig. 12a.

6. Contrary to the descriptive method which uses a full page to point out the *what*, *how*, and *why* of the physical activities, this plan indicates only *what* the job requires and *what* the worker can do. It is believed that there is no more reason for describing *why* a job requires its activities than there is for revealing the worker's diagnosis and telling *why*, for example, a worker only has the capacity for standing four hours of the work period. And again, it is believed that by indicating *what* is required, such as standing two hours, stooping one hour, and lifting 11-25 pounds for one-half hour, it then becomes extraneous to describe *how* the worker is required to stand, stoop, and lift. It is, rather, *what* the job requires and *what* the worker can do that is important for placement purposes. This approach gives this information without using the descriptive method.

7. By indicating *what* is required and *what* can be done this plan enhances both its simplicity and intelligibility. The data are both specific and spotlighted. The placement officer or the physician may get the information he desires at a glance. He does not have to read an entire paragraph and calculate the *time* and *intensity* requirements for each of the factors in which he is interested.

8. This plan appears to satisfy the requirements of a selective placement system which eliminates most of the disadvantages of other plans and which is both reliable and valid.

DISADVANTAGES: The disadvantages of this plan are not as tangible as those of other approaches. If it may be permitted, however, to speak of unknown quantities as being possible disadvantages, then this plan has several such features.

1. In examining the effectiveness of this plan several unknowns await solution:

(a) The plan was tested in but one medium plant. Before really worth while claims can be made for any plan it should be proved to be a successful technique in a number of plants in several industries. When tested under such conditions this plan may or may not be proved to be a successful system.

(b) The plan was tested for a period of six weeks. None of the 110 workers placed during this period left for physical reasons. But what will the records show for a period of three, six, and 12 months? Maybe a large percentage of the 110 workers will leave for physical reasons during these longer periods. On the other hand, very few may leave.

(c) While the forms used in the study by the physicians and the job analysts have been shown to be highly reliable, the validity of the plan as a successful placement technique was calculated for one item only: labor turnover due to physical reasons. For this item it is true that a perfect record was made, but what are the figures on production, absenteeism, and accident rates for the 110 workers studied? How might these figures reflect on the success of the plan?

(d) The system was judged on the use of the three forms shown in Figs. 14a, 14b and 14c. Fig. 14d was not tested.

(e) The flexible nature of Fig. 14d has been discussed theoretically as an advantage, but this very flexibility may prove to be a shortcoming. This may be true due to the proneness of the human mind to think in comparative terms such as are used in rating scales. It may prove too difficult for the physician to break away from thinking in such comparative terms as "none, little, moderate, and great" and to adopt in their place a system which affords complete freedom of choice—1/2's, 1/3's, 1/4's, 1/8's or whatever may be desired in connection with a particular activity. On the other hand, since Fig. 14d does have the advantages of affording freedom of choice and of yielding specific data, its substitution for less effective methods may only be a matter of education.

(f) Also for Fig. 14d, as for any technique which at this time attempts to record the physical capacities of human beings, its reliability must necessarily depend on the success of future research to establish standards by which industrial physicians in general may determine the physical capacities of workers.

Figure 13.

PLAN FOR CLASSIFICATION OF BOTH WORKER AND JOB

CLASS I—NO HAZARDOUS MACHINERY. Primarily for individuals having serious visual defects, diabetes, heart disease, or hand and arm disabilities, which increase the hazard when working with machinery such as rotary saws, punch presses, power trucks, and cranes.

CLASS II—NO HEAVY LIFTING. For individuals with various disabilities such as back injuries, deformities, and hernias.

CLASS III—GROUND-LEVEL WORK ONLY. For individuals susceptible to vertigo from any cause, or having deformities or limitations of the extremities which prevent working on such fixtures as ladders, scaffolds, and cranes.

CLASS IV—AVOID DUSTS AND FUMES. For selected individuals with chronic bronchial conditions who should be restricted from occupations such as dry grinding, sandblasting, and spray painting.

CLASS V—AVOID SKIN IRRITANTS. For individuals who are found to be sensitive to such irritants as zinc chromate paint and cleaning solvents.

CLASS VI—NO EXTENSIVE WALKING OR STANDING. For individuals with such disabilities as back lesions, varicose veins, lower extremity disabilities, and heart diseases.

CLASS VII—RESTRICT TO NOISE-FREE AREAS. For individuals with chronic ear conditions, partial deafness, or nervousness, who may have these conditions aggravated by exposure to sound levels of high intensity such as those associated with motors, speed hammers, band saws, riveting, and tumbling mills.

The seven classes shown in this figure constitute a simple specific plan for the classification of both workers and jobs. For instance, a Class I job does not involve hazardous machinery; a Class I worker cannot work around hazardous machinery; a Class I worker, then, can work at a Class I job. Arbitrary standards may be set for "Class II—No Heavy Lifting," such as, "not over 25 pounds," and for "class VI—No Extensive Walking or Standing," such as, "not over half the time."

2. In Fig. 14a, 76 items are listed for the analyst to consider. Is this not too many? Would it not be possible to eliminate many of these items and thus simplify the plan?

In the first place this form requires many items since it is a check list and does not allow for bringing out details through descriptive writing. Several of the factors, therefore, must be broken down into several items. The factor of *reaching*, for instance, is broken down into four items in order to be able to bring out which are used and in what direction the reaching is required.

Secondly, it may be necessary to use over 100 items before the physical aspects of the selection placement problem are solved and a standardized system finally developed. On the other hand, 76 items may prove to be more than are needed.

3. It was pointed out in this Chapter under "Advantages" (point 6) that this plan supplies the physical demands information essential to a selective placement program by stating *what* is required. This information is shown by using *numbers* to state the length of *time* in hours that an item is required, the items having been chosen and arranged to bring out the *intensity* of an activity. In this manner the need for describing the job requirements in writing is eliminated.

May it not be argued, however, that the descriptive method (Fig. 12a) is superior in that it provides the interpreter with a word picture of the job requirements? Possibly, then, a combination of the two methods is to be desired, that is, by using a full page for each job with data similar to that in Fig. 14b shown at the top of the form and with descriptive material similar to that in Fig. 12a shown on the lower half of the form.

On the other hand, this plan more than fulfills the purpose served by the descriptive method with the exception of providing a word picture of the job requirements. It is likely, however, that this word picture accomplishes little more than to satisfy the curiosity of the interpreter. For instance, one may form a more personally satisfying picture of a worker should his diagnosis be known in addition to his capacities, but nothing is gained as far as the placement process is concerned by knowing more than *what* the worker's physical capacities are. Similarly with jobs, all that needs to be known is *what* the requirements are.

Arguments for the descriptive method are weakened further with the thought that possibly all data on workers and jobs should be reduced to codes in order to facilitate the more accurate and rapid matching of workers and jobs through the use of automatic punch card machines.

Appendix—Definitions and Significance

THIS material offers suggestions for the guidance of those engaged in selective placement work. It is for general use rather than a manual for any particular plan. The definitions of the physical and environmental factors are those which have been given considerable trial by

Figure 14a.

PHYSICAL DEMANDS ANALYSIS
ANALYST'S WORK SHEET

Job Title *Tractor Operator, Inside* Date *9-7-44*
Job Location *All Plant Locations* Analyst *John Smith*

Numbers = Hou Required. Y = Yes. N = No.

PHYSICAL FACTORS

20/30	1	Far-Snellen	Seeing
n	2	Near-Jaeger	Seeing
y	3	Color	Seeing
y	4	Depth	Seeing
y	5	Hearing	
y	6	Talking	
n	7	Feeling	
n	8	Smelling	
n	9	Tasting	
—	10	R	Fingering
—	11	L	Fingering
6	12	R	Handling
6	13	L	Handling
4	14	R	Reaching—Below Shoulders
4	15	L	Reaching—Below Shoulders
—	16	R	Reaching—Above Shoulders
—	17	L	Reaching—Above Shoulders
—	18	R	Throwing
—	19	L	Throwing
6	20	Sitting	
—	21	Standing	
—	22	Walking	
6	23	R	Treading—Sitting
3	24	L	Treading—Sitting
—	25	R	Treading—Standing
—	26	L	Treading—Standing
—	27	Legs Only	Climbing
—	28	Legs and Arms	Climbing
—	29	Jumping	
—	30	Running	
—	31	Stooping	
—	32	Crouching	
—	33	Kneeling	
—	34	Crawling	
—	35	Reclining	
2	36	Twisting	
2	37	Resting	
3	38	1-5	Lifting (Pounds) includes Pushing and Pulling Effort while stationary
3	39	6-10	Lifting (Pounds) includes Pushing and Pulling Effort while stationary
—	40	11-25	Lifting (Pounds) includes Pushing and Pulling Effort while stationary
—	41	26-50	Lifting (Pounds) includes Pushing and Pulling Effort while stationary
—	42	51-75	Lifting (Pounds) includes Pushing and Pulling Effort while stationary
—	43	75 +	Lifting (Pounds) includes Pushing and Pulling Effort while stationary

PHYSICAL FACTORS—Continued

—	44	1-5	Carrying (Pounds) includes Pushing & Pulling Effort while walking
—	45	6-10	Carrying (Pounds) includes Pushing & Pulling Effort while walking
—	46	11-25	Carrying (Pounds) includes Pushing & Pulling Effort while walking
—	47	26-50	Carrying (Pounds) includes Pushing & Pulling Effort while walking
—	48	51-75	Carrying (Pounds) includes Pushing & Pulling Effort while walking
—	49	75 +	Carrying (Pounds) includes Pushing & Pulling Effort while walking
—	50		
—	51		

ENVIRONMENTAL FACTORS

6	52	Inside
2	53	Outside
—	54	Hot
—	55	Cold
—	56	Sudden Temperature Changes
—	57	Humid
—	58	Dry
—	59	Air Pressure
6	60	Moving Objects
—	61	Hazardous Machinery
—	62	Sharp Tools
—	63	Cluttered Floors
—	64	Slippery Floors
—	65	High Places
—	66	Electrical Hazards
—	67	Exposure to Burns
—	68	Explosives
—	69	Radiant Energy
—	70	Poor Lighting
—	71	Poor Ventilation
6	72	Toxic Conditions—Exhaust Fumes
—	73	Odors
—	74	Wet Quarters
—	75	Close Quarters
6	76	Vibration
—	77	Noise
All	78	Shifts
—	79	
—	80	

(As in example, hours apply to all but sensory factors 1-9 where Y and N are used, Snellen and Yaeger notations applying to factors 1 and 2. R, right, and L, left, are determined for right-handed workers or as required by job).

Figure 14a has been designed for use by the job analyst to determine the physical and environmental requirements of the jobs in *any* plant. It contains practically all the factors possible to encounter. After the jobs in a *specific* plant have been analyzed, the factors which are not required in the plant are deleted and the required factors are processed as shown in Figure 14b.

Figure 14b. (Actual size: 11"x17")

PHYSICAL DEMANDS ANALYSIS

Numbers = Hours Required. Y = Yes. N = No.

Job Number	JOB TITLE AND DEPARTMENT	Seeing: Far—Snellen	Seeing: Near—Jaeger	Seeing: Color	Seeing: Depth	Hearing	Talking	Fingering	Handling	Reaching: Below Shoulders	Reaching: Above Shoulders	Sitting	Standing	Walking	Treading—Sitting	Treading—Standing	Climbing: Legs Only	Climbing: Legs & Arms	Stooping	Crouching	Twisting	Resting	Lifting (Pounds) — Includes Pushing & Pulling Effort While Stationary: 1-5	6-10	11-25	26-50	51-75	75+	Carrying (Pounds) — Includes Pushing & Pulling Effort While Walking: 1-5	6-10	11-25	26-50	51-75	75+	ENVIRONMENTAL FACTORS: Inside	Outside	Hot	Humid	Moving Objects	Hazardous Machinery	Sharp Tools	High Places	Toxic Conditions	Vibration	Shifts	Job Number
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	
1	Examiner, Preparation—A	N	#2	Y	N	N	N	4	2	4	6	1	1			8													2													8						3				D	1
2	Folder, Clothing & Textile—B,C,D,E	N	#4	Y	N	N	N	2	2	6	6	3	3				6	2							2				1	1	½					½	½					8				1						D	2
3	Fork-Lift Operator—All	20/30	N	Y	Y	Y	Y			6	6	4	4				6				4							3	2	3	3											6	2			6				6 CO		6	All	3
4	Laborer, Heavy—All	20/70	N	N	N	Y	N			6	6	4	4	1	1		3	3						½	½	1	1	2	1				2	2	1				1	½	½	4	4			2			1			All	4
5	Laborer, Light—All	20/70	N	N	N	Y	N			6	6	4	4	1	1		3	3						½	½	1	1	2	1		3	2					1	1			8				2			1			All	5
6	Power-Machine Operator—B,C,D,E	N	#2	N	Y	N	N	4	4	4	4	2	2			8				4									2													8					4	2			4	D	6
7	Presser, Steam—F	N	#4	N	N	N	N	2	2	6	3	3	3	1			7	1			3	3			1				2	2					1							8	8 90°	8		7					D	7
23	Seamstress—B,C	N	#2	Y	N	N	N	6	2	2	6	2	1			8													2													8						6				D	23
24	Sizer & Marker—B,C,D,E	N	#2	Y	N	N	N	2		6	8	2	2			2	5	1							1				2						1							8										D	24
25	Tractor Operator, Inside—All	20/30	N	Y	Y	Y	Y			6	6	4	4			6				6	3						2	2	3	3												6	2			6				6 CO		6	All	25
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	

Figure 14c. (Actual size: 3"x5")

PHYSICAL QUALIFICATION REPORT

To: Medical Department Date: *18-15-44*

From: Personnel Division By: *John Day*

is *Jane Adams* Physically Qualified
(Applicant's Name)

to Meet the Physical Demands of the Jobs Listed Below:

Job Number	Yes	No
1	√	
24		√

18-15-44 — Date

Richard Roe — Examining Physician — M. D.

Figure 14b is made up after all the jobs in a specific plant have been analyzed by using the form shown in Figure 14a. As illustrated here, only 50 of the 80 factors considered in Figure 14a were found to be required in this specific plant. This information is made available to the personnel officer and industrial physician.

Figure 14c is used when workers are being hired for specific jobs. The personnel officer enters the number of the jobs for which the applicant is being considered and refers him to the physician to determine if he is physically qualified for the jobs thus listed. The physician is aided in making his *yes* and *no* determinations by referring to the physical demands analyses of the specific jobs. The diagnosis is not revealed, but for Jane Adams is "Mid-thigh amputation left leg, 1938. Fair prosthesis —occasional pain in stump. History of skin sensitivity".

Figure 14d is used by the physician when workers are being hired for jobs in general. The identical factors appear as shown in Figure 14b. Upon completing this form the physician sends it to the personnel officer who then slides the ruler-like form up and down on Figure 14b and matches the physical characteristics of worker and job. In this case, Jane Adams is physically qualified to perform jobs numbered 1, 6 and 23. Either the form shown in Figure 14c or 14d may be used for job transfers.

Figure 14d. (Actual size: 3"x17")

PHYSICAL CAPACITIES ANALYSIS

Jane Adams — Name

8857 — Badge Number

F — Sex; *58* — Age

64 — Height; *178* — Weight

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
	20/30	#2	Y	Y	Y	Y									2	2		O	O	O	O	O	O	O	O	O			O	O	O	O	2	2	O	O	O	O												
	Far—Snellen	Near—Jaeger	Color	Depth	Hearing	Talking	Fingering	Handling	Below Shoulders		Above Shoulders		Sitting	Standing	Walking	Treading—Sitting		Treading—Standing		Legs Only	Legs & Arms	Stooping	Crouching	Twisting	Resting	Lifting (Pounds) — Includes Pushing & Pulling Effort While Stationary: 1-5	6-10	11-25	26-50	51-75	75+	Carrying (Pounds) — Includes Pushing & Pulling Effort While Walking: 1-5	6-10	11-25	26-50	51-75	75+	Inside	Outside	Hot	Humid	Moving Objects	Hazardous Machinery	Sharp Tools	High Places	Toxic Conditions	Vibration	Shifts	
							R	L	R	L	R	L				R	L	R	L																																
	Seeing								Reaching											Climbing																															
	PHYSICAL FACTORS																																							ENVIRONMENTAL FACTORS									

Remarks: *Should not handle solvents.* Date: *18-15-44* Examining Physician *Richard Roe* M. D.

Blank Spaces = Full Capacity. Numbers = Hours of Partial Capacity. O = No Capacity. Y = Yes. N = No.

analysts, physicians, and placement officers under actual conditions.

PHYSICAL DEMANDS ANALYSIS: Most job analysts are familiar with the concepts that *a* TASK *is a duty or responsibility requiring the expenditure of human effort,* that *a* POSITION *is made up of a* GROUP OF TASKS *requiring the full-time services of one individual,* and that *a* JOB *is made up of a* GROUP OF POSITIONS *which are identical with respect to their* MAJOR TASKS. These concepts apply to all aspects of job analysis including physical demands analysis.

Physical demands analysis is that part of job analysis which determines the physical and environmental requirements of jobs. Physical demands analysis work may be done independently of the other aspects of job analysis or it may be done at the same time information is being secured on the skill requirements and specifications of jobs.

When analyzing the skill requirements of jobs in an establishment, the analyst usually prepares only one job analysis schedule for each job analyzed. This is true because the skill requirements of a job remain relatively constant throughout an establishment. In physical demands analysis work, however, it may be necessary to prepare several physical demands analysis schedules on one job. This is true because the physical and environmental requirements of one job may vary widely in different departments of an establishment. Conversely, however, one physical demands analysis schedule may serve to cover several jobs, that is, when the physical and environmental requirements of several jobs are basically the same.

When analyzing the physical demands of jobs, the analyst should make certain that he records all the physical activities *required* by the job rather than the physical activities which may be performed by an individual worker. For instance:

1. A worker may jump from a platform rather than use nearby steps. Although the worker does jump, jumping is not a requirement of the job since use of the steps would eliminate jumping.

2. A worker may stand at a bench while working rather than use the seat provided for him. Although the worker does stand, standing is not a requirement of the job since use of the seat would eliminate standing.

3. An arc welder may use his sense of hearing to help him maintain the proper arc by listening to the hissing sound of the arc. The job, however, does not require the arc welder to hear, the important requirement being sight whereby he can determine whether or not he is maintaining the proper arc by observing the welding process.

The analyst should also make certain that he covers the full range of physical activities required by the total job. For example, some jobs may require a daily change in the

worker's activities for several days, and again, other jobs may require a change in the worker's activities every few days over a period of several weeks. In all cases the analyst should cover physical activities required by the total job.

The job also should be covered for all shifts. Sometimes significant differences appear which require the preparation of separate schedules for the job according to shifts.

The analyst should guard against recording physical activities which are part of a special assignment and are not required by the job itself, as in the case of additional physical activities being required when a worker is temporarily assigned the duties of repairing his own equipment.

Usually it is preferable for the analyst to question and verify his observations with the foreman rather than the worker.

PHYSICAL CAPACITIES ANALYSIS: Physical capacities analysis is that part of industrial medicine which determines the physical environmental capacities of workers. It is equally suited to *pre*-placement and *re*-placement evaluation. When *pre*-placement physical examinations are given, the physician sends his analysis of the worker's physical capacities to the placement officer in order that the worker may begin his employment by being selectively placed on a job in line with his skills and physical capacities. As a *re*-placement technique, that is, when an employed worker requires a change in the physical or environmental demands of his job as a result of illness or injury, the physician sends his analysis of the worker's physical capacities to the placement officer in order that the worker may be transferred and selectively placed on a new job in line with his skills and reduced physical capacities. Similarly, as a worker's physical condition improves, he may be transferred to jobs requiring greater capacities.

In either the *pre*-placement or *re*-placement situation, however, the principles of physical capacities analysis are the same. In both situations the physician bases his analysis on the worker's history, physical examination findings, and whatever other clinical information is available. While standards are yet to be developed to assist physicians in this work, at the present time no one is better qualified than the physician to make such judgments.

Nevertheless, the physician is not without help. In the first place, in *pre*-placement situations when workers are being hired for specific jobs, the physician may be greatly aided in deciding whether or not a worker has the physical capacities to perform a specific job by referring to the physical demands data for that job. Secondly, in *re*-placement situations when a worker, because of illness or injury, possibly needs to be transferred to a job with lesser demands, the physician may be aided in deciding whether or not the worker needs to be transferred by referring to the physical demands data for his present job. The situation that is difficult, however, is when workers are being hired for jobs in general and the physician is required to give his judgment on the worker's physical capacities for jobs in general. In these general cases, however, an excellent check-up opportunity is provided the physician by those plans which require a return report from the placement officer as to the job assigned the worker. The physician may then refer to the physical demands data for the job assigned to make sure that the worker is not exceeding his physical capacities.

Physical capacities analysis, by telling what the worker can do, makes it possible to maintain the desired doctor-patient relationship by preserving the confidential nature of the diagnosis. All that the placement officer needs to know, for example, is how much and for how long the worker can lift, not what illness is behind a weight-lifting restriction. Also, by speaking of capacities in terms of job requirements rather than in terms of diagnostic data, a common language is established for all those connected with the selective placement process.

ATCHING THE ANALYSES: One of the primary responsibilities of placement officers is to see that workers are placed on those jobs which are most closely related to their experience and which are best suited to their physical capacities. The ideal placement may be said to be that situation in which the placement is made to the greatest advantage of the worker, to the greatest advantage of the employer, and to the greatest advantage of the community. In attempting to accomplish this ideal, placement officers should have complete information on the skill, physical and environmental requirements of jobs on the one hand, and on the other, they should be able to determine or secure complete information on the skill, physical and environmental capacities of workers so that the worker and job may be properly matched.

In assisting placement officers to fulfill this responsibility, physical demands and capacities analysis is the possible answer to the physical aspects of the problem, other techniques affording the necessary information on the skill characteristics of workers and jobs.

1. *Pre*-placement Evaluation: In those situations where *pre*-placement physical examinations are given by industrial physicians at the time the worker is hired, the placement officer may be operating under either or both of two conditions:

(a) Specific Jobs: When workers are being hired for specific jobs the placement officer's responsibilities are clear-cut and simple. The worker should first be interviewed by the placement officer who should be primarily concerned over determining the worker's skills. These once determined, the worker should be referred to the physician to find out if the worker has the physical capacities to meet the physical demands of the job or jobs for which the worker possesses the skills. With the physician's *yes* or *no* answer on the worker's physical qualifications for specific jobs, the placement officer's remaining task is that of assigning the worker to the greatest advantage of all concerned.

At the present time, when it is difficult for the physician to determine the physical capacities of workers for general purposes, this particular procedure is possibly superior to all others since the physician is greatly aided in determining the physical capacities of the worker by referring to the physical demands of the specific jobs for which the worker is being considered. Likewise, the placement officer need not hesitate since he receives a definite answer from the physician and may proceed accordingly.

(b) Jobs in General: When workers are being hired for jobs in general it is preferable to give the *pre*-placement physical examination immediately after the screening interview or at least before the worker contacts the placement officer for his complete interview prior to assignment. Such procedure affords the placement officer with a report on the worker's physical capacities which may be compared during the course of the interview with the physical demands of the jobs for which the worker is found to possess the skills. Assignment, again, becomes a matter of choice for the greatest good.

2. *Re*-placement Evaluation. When workers require transfer to new jobs with lesser physical demands as a result of reduced physical capacities due to fatigue, illness, or injury, here again either or both of two procedures may be followed. As under (1) above, (a) the worker may be sent to the physician to find out if he is physically qualified for specific jobs which are known to require lesser demands, or (b) the physician may give his analysis of the worker's reduced physical capacities which may then be used by the placement officer to effect a transfer to a new job which is compatible with the worker's reduced capacities.

3. Evaluation by Placement Officer: In those unfortunate situations where workers are hired or transferred without physical examinations given by a physician, the responsibility for determining the worker's physical capacities usually falls on the placement officer to handle as best he can. This means that the placement officer must accumulate medical information in order that he will be in a position to question the worker and form an opinion as to the worker's physical capacities.

While such practice is both limited and dangerous, one of the best aids to placement officers in such situations is to have adequate information on the physical and environmental demands of the jobs. With such data the place-

ment officer is then in a position to ask a worker specific questions, such as: "Do you think you could work at this job which requires four hours standing, two hours walking, and two hours sitting?" "Could you lift up to 50 pounds for one hour?" "How about going up and down stairs for one hour each day?" "Does noise bother you?" "Do you feel fairly safe around moving equipment?" Through such questioning it is possible for the placement officer to arrive at a fair lay opinion on the physical capacities of a worker.

Placement officers may increase their knowledge of physical handicaps by securing publications on the subject from the State Bureaus of Vocational Rehabilitation, the Vocational Rehabilitation Service of the Veterans Administration, and the U. S. Employment Service.

4. Related Activities: While primarily a technique for placing all workers on jobs in accordance with their physical capacities, physical demands and capacities analysis also is a source of help to the personnel department in other ways.

(a) Liaison with Engineering and Safety Departments: Since physical demands analysis determines the specific physical and environmental requirements of jobs, such data placed in the hands of the plant's industrial engineers and safety engineers may well supply basic information for the engineers to use in reducing or eliminating certain physical and environmental demands and thus make jobs less energy consuming and less hazardous.

(b) Liaison with Schools, Rehabilitation Agencies, and the U. S. Employment Service: By a plant furnishing its physical demands data to the local officers of these organizations, relationships may be developed to improve the plant's labor sources. In vocational guidance work with school youth, and in vocational rehabilitation work with those whose skills have been lost or impaired as a result of illness or injury, physical demands and capacities analysis may be used as a helpful technique in determining the direction and kind of training most suitable for the individual. It may also aid in the individual's physical restoration by helping to determine the most suitable measures to take in physical education or by helping in the selection of prosthetic appliances to enable maximum satisfaction on a specific job. Likewise, the U. S. Employment service would be in a better position to serve the plant by referring applicants with the skills and physical qualifications for specific jobs. Plants also may find these organizations a source of help in making an analysis of their jobs.

(c) Supervision, Follow-Up, and Evaluation: In developing job satisfaction, with analyses of worker and job at hand a better basis is provided for on-the-job supervision and follow-up by the foreman, placement officer, or physician. The analyses also provide a basis for the maintenance of statistical records to evaluate a selective placement program.

Definitions of Physical Factors

SITTING: Resting upon the haunches as in occupying a bench, chair or saddle. Squatting or sitting on the heels should be considered as *crouching*, not *sitting*.

2. *Standing:* Supporting oneself on the feet and legs in an upright or nearly upright position.

3. *Treading:* Exerting force upon an object with either or both feet and legs. This activity may be required from a sitting position as in operating the pedals of an automobile or from a standing position as in operating a clothes press.

4. *Walking:* Moving about on the feet by taking alternate steps, setting one foot before the other without running.

5. *Climbing:* (a) Ascending or descending such fixtures as ramps and stairs by using the feet and legs. (b) Ascending or descending such fixtures as ladders, scaffolding, poles and ropes by using the hands and arms as well as the feet and legs.

Since there are differences in the energy requirements it is advisable to consider this activity as defined in two parts. Also, *balancing* is sometimes considered as a separate factor and used in connection with *climbing*. *Balancing*, however, is an implied requirement of many factors such as *standing*, *walking* and *running* and need not be considered as a separate factor. If a worker has poor balance for some reason, there is no need to check *balancing* but merely to restrict activities such as *climbing* and *high places*.

6. *Jumping:* Projecting the body up, down or horizontally through the air, primarily by a muscular action of the feet and legs.

7. *Running:* Moving rapidly by using the feet and legs more quickly than in walking.

8. *Stooping:* Bending the body downward from a standing position by bending the spine and at the waist. Not to be confused with *crouching*.

9. *Crouching:* Bending the body downward from a standing position by bending the legs in addition to bending the spine, including squatting and sitting on the heels. Not to be confused with *stooping*.

10. *Kneeling:* Bending the legs at the knees to come to rest on the knee or knees.

11. *Crawling:* Moving about on the hands and knees or hands and feet.

12. *Reclining:* Assuming a horizontal working position on the back, side or front.

13. *Twisting:* Turning the body partly around from stationary positions such as standing, kneeling and reclining, involving a tension on the body muscles and spine.

14. *Fingering:* Picking, pinching or otherwise working with dexterous movements of the fingers of either or both hands. Not to be confused with *handling*.

15. *Handling:* Seizing, holding, grasping, turning, or otherwise working with the hands of either or both arms. Not to be confused with *fingering*.

16. *Reaching:* Extending the hands and arms in any direction. It is advisable to divide this activity into reaching above shoulder height with either or both arms and reaching below shoulder height with either or both arms.

17. *Throwing:* Propelling an object through space by a swinging motion of either or both hands and arms with or without the use of tongs or other devices.

18. *Lifting:* Raising or lowering an object from one level to another by using muscular strength, usually by grasping the object with the hand or hands, including pulling upward.

19. *Carrying:* Transporting an object, usually by holding it in the hands and arms.

While *lifting* and *carrying* present no problem to the analyst, these two factors are most difficult for the physician to determine. To illustrate the problem for the one factor of *lifting*, suppose that the physician decides it is safe for a worker to lift 25 pounds for half the work period. Can this worker then lift 15 pounds for the full work period, 35 pounds for a quarter of the work period, 50 pounds for one hour, 100 pounds once a day, never over 25 pounds, or what? Unfortunately, the answer must await solution through adequate research. In the meantime, however, it is possibly safest for the physician to state the maximum weight be believes the worker should lift at any one time and then give the maximum time the worker should lift that weight. If, for instance, the maximum weight a worker should lift was 50 pounds and the maximum time he should lift 50 pounds was one hour per day, then this would give the placement officer a foundation from which he might reasonably conclude that the worker would probably be safe on a job which required lifting 25 pounds for half the work period.

20. *Pushing:* Exerting force upon an object so that the object moves away from the force, including slapping and striking.

21. *Pulling:* Exerting force upon an object so that the object moves toward the force, including jerking.

The factors of *pushing* and *pulling* are even more complex than *lifting* and *carrying*. While it is possible for the analyst to measure the pushing or pulling force exerted by setting up scales for this purpose, the results are most misleading due to the numerous body positions from which these activities may be required. For example, one worker may be required to reach above his head and pull wires through a conduit, and, pulling with all his strength from this position, may exert a force around 20 pounds. Another worker may be required to pull wires through

a conduit at waist height, and, with one foot braced against the wall, may exert a force around 200 pounds with very little effort. Field and laboratory studies with the factors of *pushing* and *pulling* reveal that certain body positions require more effort to push or pull five pounds than other positions require to push or pull 300 pounds; also, that there are possibilities of several hundred body positions which may be required to perform these activities. It is therefore evident that recording the force exerted in pushing and pulling may lead to a serious misunderstanding since it may be thought that pushing or pulling with a 20-pound force requires little effort and pushing or pulling with a 200-pound force requires great effort, while, in fact, depending on the body position, the exact opposite may be true.

Because of this complication it is probably best that the analyst convert the pushing or pulling force required into its equivalent of *lifting* so many pounds, that is, when pushing and pulling are required from a stationary position such as sitting, standing, stooping and reclining. When, however, pushing and pulling are required while moving, as in pushing a hand truck, then the force exerted should be converted into its equivalent of *carrying* so many pounds. At the present time, however, research is incomplete and there is no conversion table to assist the analyst in calculating the lifting and carrying equivalents of pushing and pulling efforts. But, even so, in the meantime the analyst's guess as to the lifting or carrying equivalent is better than showing the actual force exerted in pushing and pulling since data on the actual force exerted has been proved to be most misleading. Likewise, from the physician's viewpoint, the problem is simplified by having it understood that a worker should not exert greater effort in pushing and pulling than that exerted in lifting and carrying the maximum load allowed the worker.

22. *Resting:* Inaction due to the intermittent nature of the job, as in the case of a tack welder who is required to be inactive while waiting for others to prepare the materials to be welded.

Should a worker have periods of inaction totaling two hours per day, then this two hours should be shown under *resting*, not under *sitting*, *standing*, or *walking* even though the worker may sit, stand, or walk during these two hours.

23. *Seeing:* Perceiving the nature of object by sight.

While it is not difficult for physicians to determine the visual capacities of workers, there is no easy or even accurate method for determining the visual requirements of jobs. The visual analysis of jobs presents a very complex problem. Even after long and extensive study on the part of optical research laboratories, the present techniques, while far advanced over former methods, are still developmental. They do more to define the problems involved rather than to answer them. Nevertheless, while refinements are being awaited, plants with problems in industrial vision might benefit by investigating some of the advanced techniques now available through the larger optical companies. Surely industrial vision is a professional field of its own and requires the services of industrial ophthalmologists.

Only in a coarse fashion can the job analyst do visual analysis work. Far better than no visual program at all, however, the analyst can be of help in the following ways:

(a) Far Vision: The analyst can determine the size of the most difficult object required to be seen at a distance of 20 feet or more. Once this is done he can refer to Fig. 15, "Snellen Visual Acuity Table," and determine the vision required in terms of Snellen notations. For instance, if a worker is required to see finger signals at 100 feet, then, assuming that average fingers are about three inches long, the analyst refers to Fig. 15, finds three inches in the first column, follows across the page to the 100-foot column, and there finds the figure 30, meaning that the worker needs 20/30 vision to see finger signals at 100 feet.

The table in Fig. 15 was recently developed in connection with the plan discussed in Chapter VII. While this table is mathematically correct, it is, nevertheless, none too reliable since it is based on the Snellen technique which is inaccurate to begin with. It does, however, help analysts to do more with visual requirements than they have been able to do in the past.

(b) Near Vision: The analyst also can determine the most difficult object required to be seen at a close working distance. Then, by converting the size of the object into its equivalent size of printed type on the Jaeger Chart, he can approximate the near vision requirements according to the Jaeger Chart. Jaeger Charts are available for a small cost at practically all surgical supply houses.

24. *Color Vision:* Perceiving the color of objects by sight.

25. *Depth Perception:* Perceiving distances of an object from the observer or from one object to another at different distances from the observer. This factor usually is required by most jobs involving machine operations.

26. *Hearing:* Perceiving the nature of sound by ear.

27. *Talking:* Expressing or exchanging ideas by means of the spoken word.

28. *Feeling:* Perceiving such attributes of objects as size, shape, temperature or texture by means of the receptor nerves in the skin, primarily those of the finger tips.

29. *Smelling:* Perceiving odors through the olfactory nerves of the nose.

30. *Tasting:* Perceiving flavors through the taste buds of the tongue.

For the sensory factors numbered 24 through 30, from the practical point of view it is only necessary to indicate whether or not these factors are required by a job with a *yes* or *no* answer. For example, the fact that a job requires the worker to recognize colors is important, but whether he must recognize colors all day or only once during the day is relatively unimportant.

DURATION, INTENSITY AND FREQUENCY OF PHYSICAL FACTORS: Factors numbered 1 through 22 involve duration, intensity and frequency.

(a) Duration: By duration is meant the over-all time required by an activity. Time requirements may be expressed by the analyst in several ways, such as in hours, minutes, percentages, number of times required during the day, and by such words as "constantly, frequently and occasionally."

Figure 15.

SNELLEN VISUAL ACUITY TABLE
(Based on 5 Minute Arc)

Object in Inches	Distance in Feet															
	5	10	20	40	60	80	100	200	300	400	500	1000	2000	3000	4000	5000
¼	70	30	15													
½	100	50	30	15												
¾	200	70	40	20	15											
1	400	100	50	30	20	15	10									
2	600	200	100	50	40	30	20	10								
3	800	400	100	70	50	40	30	20	10							
4		400	200	100	70	50	40	20	15	10						
5		600	200	100	100	70	50	30	20	15	10					
6		600	200	100	100	70	70	30	20	15	15					
7		800	400	200	100	100	70	40	20	20	15					
8			400	200	100	100	70	50	30	20	20	10				
9			600	200	100	100	100	50	30	20	20	10				
10			600	200	200	100	100	50	40	30	20	10				
11			600	200	200	100	100	50	40	30	20	10				
In Feet:																
1			600	200	200	100	100	70	40	30	20	10				
2			800	600	400	200	200	100	70	70	50	20	10			
3				800	600	400	400	200	100	100	70	40	20	10		
4					800	600	600	200	100	100	100	50	30	15	15	
5						800	600	200	200	100	100	70	40	20	20	10
6							800	400	200	200	100	70	40	20	20	15
7								400	200	200	100	70	50	40	30	20
8								600	200	200	200	100	50	40	30	20
9								600	400	200	200	100	50	40	30	20
10								600	400	200	200	100	70	40	40	20

REFLEX HEADACHE

Headaches of reflex origin are a puzzling and troublesome problem. Their origin may be from the eyes, the naso-pharynx, the vascular system, the gastro-intestinal tract or may be quite obscure.

Symptomatic relief, however, can be successful before the true cause of the difficulty has been determined.

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Caffeine	gr. ½ (0.032 gm.)
Acetylsalicylic Acid .	gr. 3½ (0.227 gm.)

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For the average routine job the total time the worker is required to be on his feet should equal the sum of the time required by the separate factors of *standing, walking, climbing, jumping* and *running*. Likewise, the total time the worker is not required to be on his feet should equal the sum of the time required by the separate factors of *sitting, kneeling, crawling* and *reclining*. (With the exception of *resting*, all other factors are required in connection with the factors mentioned in this paragraph.) Therefore, the total time on the feet, plus the total time off the feet, plus the *resting* time required, should equal the total time of the work period.

For those jobs with variations in their physical demands, the analyst should express the maximum time any one factor is required. As an extreme example, if a job requires *sitting* all day the first day, *standing* all day the second, and *walking* all day the third, then each of these factors should be shown as being required for the full length of the work period.

In connection with the factors of *lifting* and *carrying*, the time an object is carried should also be included in the time the object is lifted. Carrying time, therefore, should never exceed lifting time. If, for example, a worker is required to stand at a bench and lift 25-pound objects for one hour and is also required to carry the 25-pound objects away from the bench for one hour, then it should be shown that the worker is required to lift 25 pounds for two hours and carry 25 pounds for one hour since he must also lift while he carries.

(b) Intensity: By intensity is meant the effort required in performing an activity. Lifting 50 pounds, for example, requires greater effort (or intensity) than lifting 25 pounds. Intensity and time requirements are closely related and an expression of the time requirement also helps to explain the intensity. To illustrate, lifting 50 pounds for two hours is more intense than lifting 50 pounds for one hour.

Under the descriptive method, as in Fig. 12a, the analyst can go to any length desired to show the time and intensity requirements of activities. As examples, with the intensity requirement in *italic*, "Standing at work bench lifts and handles steel parts weighing up to *25 pounds* (one hour)," "Reaches *above shoulder height with right arm* to press control button (one hour)," and, "Walks on *slippery steel floors cluttered with hoses and materials* (two hours)."

Under the check list method, as in Fig. 14a, similar information is presented on the time and intensity requirements of factors, the check list, however, having been designed to automatically show both the time and intensity requirements simultaneously. For instance, under the check list method for the first example in the preceding paragraph, the appropriate item in Fig. 14a would be marked one hour to show that the job required lifting up to 25 pounds for one hour. For the second example, the appropriate item would be marked one hour to show that the job required reaching above shoulder height with the right arm for one hour. And for the last example, the factors of *walking, slippery floors*, and *cluttered floors* would each be marked two hours to show that the job required walking on slippery and cluttered floors for two hours.

(c) Frequency: By frequency is meant the rate at which an activity is required, such as six times per hour, every two hours, or twice daily.

Under the descriptive method the frequency requirement can be shown, such as, "Reaches above shoulder height with right arm *about every 10 minutes* to press control button (one hour)." Under the check list method, however, the frequency requirement is sacrificed.

In connection with frequency, considerable study has shown that any one factor (unless required for the full work period) is rarely required for a constant period, but, instead, is required intermittently. For instance, when a job requires a certain activity, such as lifting 25 pounds for one hour, it is the very rare case that requires this activity to be constantly performed for the one hour; rather such an activity is usually required to be performed intermittently and spread over a period of several hours. Therefore, with the knowledge that activities are usually intermittent in nature there is little need for showing the exact frequency. By specifically showing the total time and intensity requirements of factors, and with the knowledge that the activities are practically always intermittent in nature, adequate data may thus be presented on the physical and environmental demands of jobs.

Definitions of Environmental Factors

INSIDE: Indoor protection from weather conditions.

2. *Outside:* Out of doors or under an overhead covering with slight protection from the weather.

3. *Hot:* Temperature sufficiently high to cause perceptible bodily discomfort.

4. *Cold:* Temperature sufficiently low to cause perceptible bodily discomfort.

5. *Sudden Temperature Changes:* Variations in temperature which are sufficiently marked and abrupt to cause perceptible bodily reactions.

6. *Humidity:* Atmospheric condition with moisture content sufficiently high to cause perceptible bodily discomfort.

7. *Dry:* Atmospheric condition with moisture content sufficiently low to cause perceptible bodily discomfort.

8. *Air Pressure:* Force exerted by atmosphere or compressed air resulting in abnormally high or low air pressure.

9. *Moving Objects:* Exposures to moving equipment and objects such as overhead cranes, hand and motor driven vehicles, and falling objects which involve the risk of bodily injury; also, the act of operating such equipment, as in driving a truck.

10. *Hazardous Machinery:* Exposure to the moving parts of stationary machinery involving the risk of bodily injury.

11. *Sharp Tools:* Exposure to tools and materials with sharp edges involving the risk of bodily injury.

12. *Cluttered Floors:* Walking surface of workplace necessarily strewn with equipment, tools or materials (not a condition of poor housekeeping) involving the risk of tripping and falling.

13. *Slippery Floors:* Walking surface of workplace which involves the risk of slipping and falling due to such agents as grease, oil, water, and polish, or due to use as in the case of steel surfaces.

14. *High Places:* Workplace at an elevation above the floor or ground level from which it is possible to fall and be injured.

15. *Electrical Hazards:* Exposure to electric wires, transformers, bus bars, or other uninsulated or unshielded electrical parts or equipment which involve the risk of general or fatal shock.

16. *Exposure to Burns:* Workplace involving the risk of burns from hot materials, fire or chemical agents.

17. *Explosives:* Exposure to explosive gases, vapors, dusts, liquids and substances which involve the risk of general or fatal injury.

18. *Radiant Energy:* Exposure to (a) radioactive substances such as radium, uranium or thorium, (b) to x-rays, and (c) to ultra-violet rays or infra-red rays, which involve the risk of impairment of sight or general or localized disabling conditions.

This definition of *radiant energy* is general, and, as defined, involves three parts. In the final presentation of data on the environmental requirements of jobs, however, the specific kind of radiant energy encountered should be indicated. For example, in shipyards where electric welding arcs give off ultra-violet and infra-red radiation, this item should be named more specifically, such as, "Exposure to Welding Arcs," rather than called "Radiant Energy."

19. *Poor Lighting:* Illumination of workplace below the standards set by the American Standards Association Code, Illuminating Engineering Society of New York.

20. *Poor Ventilation:* Air conditioning of workplace below the standards set by the American Society of Heating and Ventilating Engineers.

21. *Toxic Conditions:* Exposure to harmful fumes, gases, vapors, mists, liquids, or dusts which cause general or localized disabling conditions as a result of inhalation, ingestion, or absorption by the skin.

This definition of *toxic conditions* is general in nature. When analyzing the jobs in a plant, however, all the toxic conditions encountered should be specifically indicated. In Fig. 14a, for example, "Exhaust fumes" is written after "Toxic Conditions." Upon analyzing all the jobs in the

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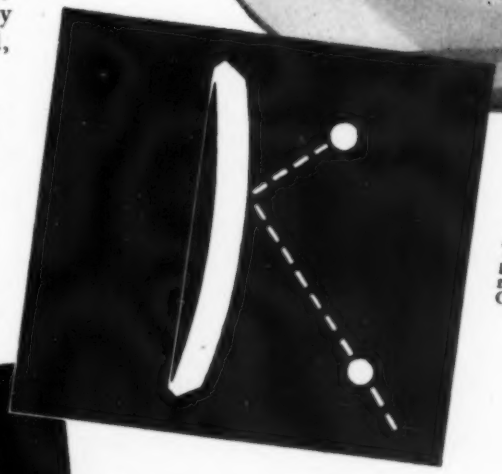

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plant, the various toxic conditions encountered should then be listed and numerically coded. For instance, supposing that carbon tetrachloride is number 17 on the list of toxic conditions found in the plant, then by showing the figures 1-17 it would be indicated that the job requires the worker to be exposed to carbon tetrachloride for one hour of the work period. When, however, too few toxic conditions are found in a plant to require coding, then the specific condition can be written in the chart itself. In Fig. 14b, for example, 6-CO is written in the "Toxic Conditions" column for the job of "Tractor Operator, Inside" to show that the worker is required to be exposed to the carbon monoxide fumes from his tractor for six hours of the work period.

22. *Odors:* Perceptible smells about the workplace.

It is questionable that the environmental factor of *odors* should be considered in physical demands analysis work. If the odor is a toxic fume, then it will be covered under *toxic conditions*. If the odor is non-toxic, then what may be a pleasant odor to one person might be distressing to a second person, and, to a third, neither pleasant nor distressing. Odors are a matter of individual reactions and therefore it is impossible to decide whether or not an odor is distressing other than to oneself.

Another factor, which is sometimes used and which is in this questionable category along with *odors*, is that of *dirty*. What is dirty work and what is not dirty work? In broad terms possibly all white-collar jobs are "clean jobs" and all other jobs are "dirty jobs." But with such a concept it becomes meaningless to indicate routinely that each white-collar job is a "clean job" and that each job other than a white-collar job is a "dirty job." Again, this is a problem for the individual to decide. It is possibly better, therefore, to ignore the factors of *dirty* and *odors* in physical demands analysis work.

23. *Wet Quarters:* Workplace requiring contact with water or other liquid.

24. *Close Quarters:* Workplace where freedom of movement is restricted or where worker cannot maintain an upright position; also, a relatively small enclosed workplace which might excite the fears of one who suffers from claustrophobia.

25. *Vibration:* Production of a quivering movement of the body muscles, particularly those of the legs and arms, as from repeated motion, pressure or shock.

26. *Noise:* Sufficient sound to distract workers engaged in "mental" occupations, such as sound greater than those made by typewriters or other common office equipment, or sufficient sound to cause possible injury to the sense of hearing of workers engaged in "manual" occupations, such as sounds from nearby chipping and riveting operations.

27. *Shifts:* The work periods established by the plant for the job being analyzed, such as: (a) Day Shift: Work period from approximately 8:00 A.M. to 4:00 P.M. (b) Swing Shift: Work period from approximately 4:00 P.M. to midnight. (c) Graveyard Shift: Work period from approximately midnight to 8:00 A.M.

28. *Working With Others:* Job requiring direct occupational cooperation with fellow workers or direct contact with the public.

29. *Working Around Others:* Job requiring independent occupational effort but in proximity to fellow workers or the public.

30. *Working Alone:* Job requiring independent occupational effort and virtually no contact with others.

Environmental factors numbered 28, 29 and 30 are sometimes used in physical demands analysis work in the hope that they may be helpful in placing workers with neuropsychiatric disorders. The practical value of these three factors, however, is questionable. Most jobs require either (a) *working with others*, (b) *working around others*, or (a + b) working with and around others. Very few jobs require (c) *working alone*. For workers with such disorders it is usually a question of their being placed *with and/or around others* or being placed *alone*. But since very few jobs require *working alone* it is doubtful that these three factors are of enough practical value to be included on a standard form.

In a general consideration of workers with neuropsychiatric disorders, as the technique of physical demands and capacities analysis becomes further developed a solution to the problem of adjusting these workers on jobs may be found. By better understanding the environmental factors required by these workers, and by better understanding how to refine the analysis of these factors as required by jobs, it is likely that patterns may be developed whereby the placement of such workers might become more successful. At the present time, for example, knowledge of such factors as *high places*, *close quarters*, *noise*, and *vibration* is quite helpful in placing these workers. The over-all problem in this connection, however, involves the 24-hour day rather than the work period alone. Possibly, then, the answer may be found for these individuals by extending, developing, and applying the technique of physical demands and capacities analysis for the 24-hour day.

Burns From Hot Sealing Wax

JOHN SASSANI, M.D.,
Physician in Charge,
Remington Rand Inc., Propeller Division,
Johnson City, New York

IN THE first aid room, the industrial nurse is at all times prepared to meet the run-of-the-mill emergencies which occur in every industry. It is the unusual and hitherto unforeseen emergency which challenges the intelligence and skill of the medical and nursing professions. An emergency, typical of the unusual and unforeseen, occurred recently in our plant.

An employee in the plant shipping department tangled with the electric cord attached to the electrically-heated sealing wax melting pot, spilling a quantity of the hot wax on his hand. A thick coating of the hot wax, raised to 350° F, promptly hardened into a perfectly formed mold over about one-third of the surface of the victim's hand before he arrived in the first aid room. Specifically, the posterior and anterior surfaces of the hand and wrist, involving the thumb and index finger, were covered with molten wax.

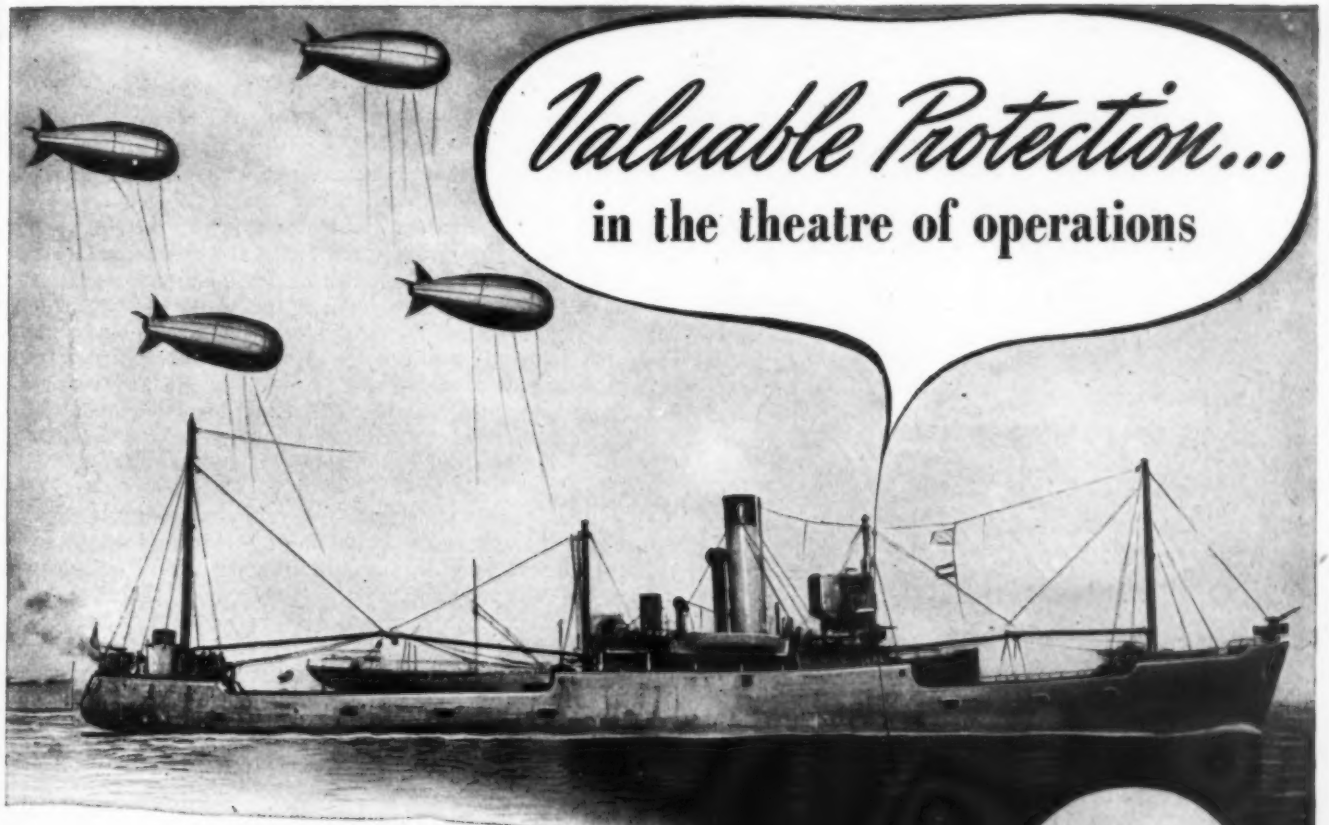
The skin layer under the wax was thoroughly seared and adherent to the wax. When it was possible to examine the full extent of injury, it was found that a deep second and third degree burn had resulted. A sedative was administered to control extreme pain.

Attempts to crack the solid coating of wax so that it could be removed were unsuccessful and painful, and it was obvious that further damage to the underlying burned area would follow.

In the hope of furnishing some slight relief to the patient, ethyl chloride was used at the exposed edge of the wax mold. Very little local anesthesia effect was possible, but the following favorable results were noted: The ethyl chloride, directed upon the wax, froze it. Instead of retaining the tough, resistant consistency, the wax was immediately brittle, allowing it to break easily into small fragments which could be readily removed with thumb forceps. As pieces of the wax were removed, it was then possible to anesthetize the sensitive underlying area and thoroughly to clean the entire surface of all evidence of the wax.

In subsequent experiments with the wax, it was further observed that prolonged application of the ethyl chloride to the hard sealing wax had the effect of liquefying it to a degree. For expedient reasons, however, it was proved that in the treatment of burns, it is easier and cleaner to handle the wax at the brittle, breakable stage. The thinner consistency, resulting from longer exposure to the ethyl chloride, would tend to involve the burned tissue with the sticky quality of the wax, thus complicating its removal.

Complete removal of the wax and thorough cleansing of the burned area were followed with the immediate application of a soppy Foille dressing to alleviate pain and to promote healing.



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The Present Practice of Industrial Medicine

McIVER WOODY, M.D.,
New York City

THIS Forum would be incomplete if there were no one here to speak for the physicians in industry, particularly those pioneers in this special field of medical practice who pointed out nearly 30 years ago the need for better medical care of working people. A few of these industrial physicians, at the risk of neglecting their responsibilities within the plant, expanded their medical programs to include the medical care of disabled employees and members of their families in their own homes. Others sought to arouse interest in group purchase of medical care. Failing to get any response from their local medical societies they gave encouragement and advice to groups of employees who organized their own mutual benefit medical and hospital associations.

The present shortage of physicians has aroused still wider interest in the problem of providing medical care for all who need it, and a satisfactory solution appears to be near at hand with the return of trained Army doctors once the war is over. The medical and surgical plans of the state medical societies as well as such government sponsored organizations as The Health Insurance Plan of Greater New York are forward-looking and practical. Many physicians will soon be able to concentrate their attention on this field, and the general health level of the population will rise accordingly.

The previous speakers have presented the subject of medical care so well that I should like to assure you that the organization with which I am connected is entirely in sympathy with them. Some 10 years ago The Standard Oil Company did all it could to interest the medical profession of a nearby city in a similar plan. One of their leaders gathered a representative group of general practitioners and specialists at his home one night to listen to a presentation of the plan. Our industrial relations man began by stressing our company's sincere interest in helping its employees to protect themselves and their families from the overwhelming burden of unexpected illness. He suggested that our employees purchase medical care on a monthly basis by means of payroll deductions and that all the money collected in this way be turned over each month to the local medical society to be divided among the doctors on a unit basis that would repay each doctor for his services. This proposal, though listened to with interest, was not accepted for at that time the profession was not prepared for such a step. Although the plan was not adopted, we are inclined to take pride in the fact that it may have paved the way for the excellent medical-surgical plan that was finally set up by their state medical society a year or two ago and which is now functioning most efficiently.

My topic, "The Present Practice of Industrial Medicine," is an important part of the larger subject under discussion this afternoon. Indeed, it lies very close to the interests of most business men. Most of us here no doubt believe that the individuals who make up an industrial organization are its chief assets. When such a group of people has worked together for many years, it is they who spell the success or failure of the organization. Enormous sums are spent on the upkeep of machinery. Why then, should not some money be spent on the physical condition of these individuals?

Championship football teams have a squad doctor who is on the field every afternoon staying until the team's

Read before the New York Board of Trade, November 9, 1944; published in *The Medical Bulletin*, of the Standard Oil Company (New Jersey), 6: 3, 169-176, April, 1945.

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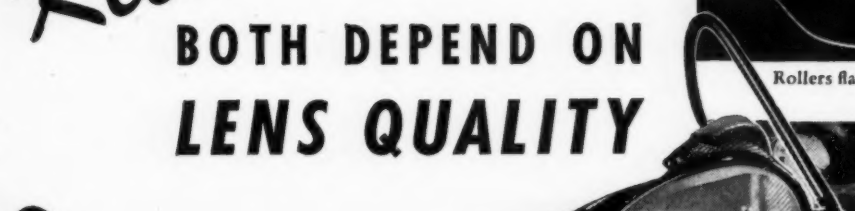

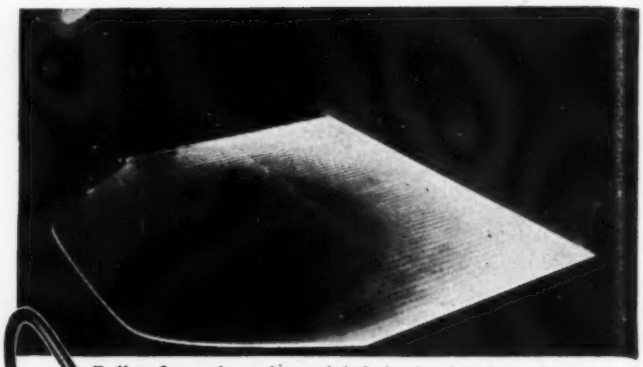

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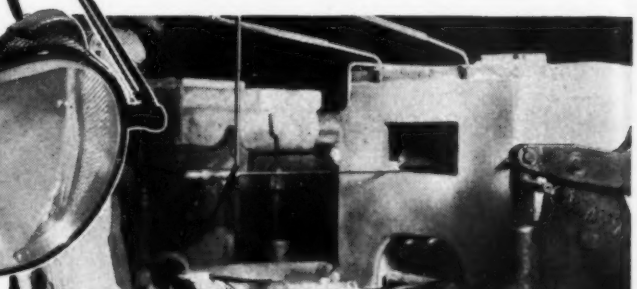

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practice is over, not so much for the sake of taking care of minor accidents as they occur as for the purpose of getting to know the players intimately and in order to prevent their overdoing and becoming as we say in medical jargon, "accident prone." The result is that on the afternoon of the big game the doctor is able to follow every player and sense any onset of physical fatigue before an accident occurs. As you probably know it is usually the tired, groggy player who gets hurt. A wise football doctor is able to prevent such injuries by pulling the weary players out of the game before an accident occurs. The physician in industry seldom has a chance to do anything as spectacular as this, but his intimate knowledge of the organization enables him to give timely advice, which not only helps maintain the physical efficiency of the employees but makes for peak production without undue loss of time by those who are working longer hours under greater strain.

The present war has affected the practice of industrial medicine in at least two different ways. The manpower shortage has increased the volume of medical work quite considerably even while there are fewer medical men to cope with the problem. No longer are accidents or illnesses the only responsibility of the industrial physician. The lengthening of the work schedule, the resort to night shifts, the employment of women, the adoption of new manufacturing methods and the introduction of new materials and compounds has brought new problems for him to solve. The scarcity of physicians trained in this type of work has, however, forced many industrial organizations to depend more and more on industrial nurses and to welcome the services of technicians and first-aiders whose training was sketchy but who are quite helpful in many ways. These people lack, nevertheless, the experience and the background of either medicine or nursing and while of very real use in this emergency cannot be depended on in long-range planning for the future. Much credit is due them for the excellent way in which they are doing their bit to help out in all medical departments; but there is good reason to believe that when the time comes to convert industry to a peace-time basis, both industrial nurses and first-aiders will take a more normal place in our large industrial organizations.

When the war is won, instead of longer hours and night shifts, plants will return to more natural schedules. Many women who are holding down hard jobs will gladly return to their homes as they did after the first World War. In some instances their places will be taken by old employees recently released from military service, in others by that vast army of youth now in training. Some of these veterans will be disabled and physically incapable of returning to their former jobs no matter how familiar they are with them. These men will be fitted into the organization at other more suitable jobs. New products and new methods will call for even more careful study and supervision of our working population to give them adequate protection against new and strange occupational diseases.

No longer will there be a scarcity of trained industrial physicians. Indeed, there bids fair to be an unprecedented abundance. Doctors in the armed forces have experienced the satisfaction of caring for men whom they know well. These doctors (like the doctors looking after the football squad) have learned to know their men while the men have learned to respect and admire their doctors. That is why, perhaps, when the Morale Section was first organized a medical officer was chosen to head it. These Army doctors have a proper understanding of paper work and realize its necessity

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in any large organization, something it often takes a man in private practice a long time to learn.

According to information released only last week, some 60,000 physicians are serving in the Armed Forces and the Veterans Administration; this represents approximately 40% of the active medical profession of the United States. This summer, in answer to a pilot questionnaire which was sent to physicians in service by the Committee on Post War Service, 35% of them said they were interested in doing some form of industrial medicine on their return. That means that some 20,000 doctors now in military service are looking forward to positions in industrial medical practice when they return to civilian life. These physicians know what they want. Many of them have had experience in private practice and all of them have received intensive training in military medicine followed in most cases by service with troops. Watching over the health of enlisted men as they travel to the theatre of operations abroad, going with them into action, and caring for those who are wounded or stricken with disease, these Army doctors know what it is to give large groups of men the best professional care possible under the circumstances. Such a definition might well describe the practice of industrial medicine. After all, is not the application of the science and the art of medicine to the prevention and treatment of injury and disease exactly what the best industrial physician seeks to do.

Whether the physician is on a full-time or a part-time basis is beside the point. It is easier for a full-time physician to win a place for himself in an organization where everyone knows that he too is a regular employee; but, if there is not enough medical work to keep him occupied the only possible solution is for him to accept a part-time arrangement that will leave him free to serve other concerns in a similar capacity or to carry on his own private practice in the community. However, if he is on part-time, he must be provided with a capable subordinate, preferably an experienced industrial nurse, who can be depended on to carry on the work of the department in his absences just as carefully as if he were present in the plant the entire day. In other words, an industrial medical department must be built around an individual physician who is qualified in the field of industrial medicine if he is to have the confidence of both employees and management.

As recently as our own Civil War, soldiers went into battle without any medical officers to look after them. Today in modern armies, the tables of organization call for one medical officer to every hundred soldiers. It is hard to believe that our returning veterans will be satisfied to work in a plant where there is no medical supervision to guard them from occupational disease and no doctor to assist them in maintaining themselves in good physical condition or to look after injuries received in the course of their day's work.

Twenty thousand doctors such as these Army physicians, in addition to the industrial physicians already in practice, could transform the practice of industrial medicine in this country and raise health standards appreciably in less than a decade. According to the latest available census figures there are some 10,000,000 employees working in industrial establishments. This would mean that there would be one of these new doctors for every 500 wage-earners. This is not excessive because each doctor would be looking after only five times as many men as he did in the Army—yet figures show that the accident rate in industry is large enough to warrant good medical service reasonably near at hand at all times.

How many of the 20,000 returning medical officers

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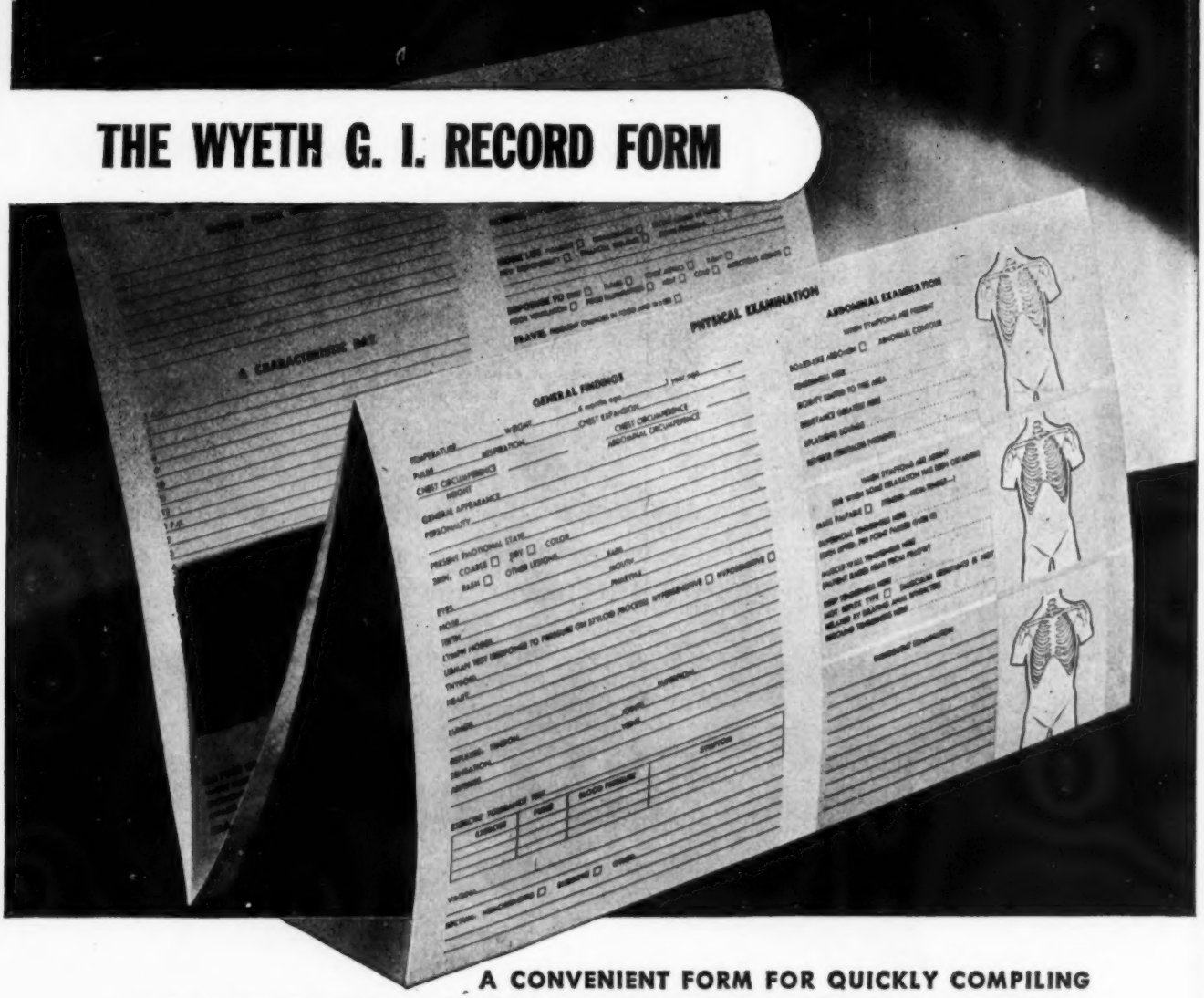

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who profess interest will make a real effort to get jobs in industrial medicine, in insurance companies or on a part-time basis cannot be guessed at, but if management is as conscious of the need for doctors as the doctors are conscious of the need for their services, it would seem likely that industry can assimilate any physicians desiring positions both quickly and successfully.

Dealing so sketchily with the industrial physician, his present duties and his future ones, I have had to limit my discussion quite arbitrarily. I have not dared even touch on the necessity for the preliminary health examination, the general yearly examination which takes a doctor's time, even though the man seems quite well and the examination merely a routine one. I haven't mentioned the necessity for health education or the need to convince the man at the bench that the doctor is his friend. I haven't mentioned where the doctor's office belongs in the plant, and yet it is a very live issue. It should be near the men so that if they are hurt they can reach it quickly. Nevertheless, it must also be near enough the entrance so that new employees will not get lost hunting for it. It must also be reasonably quiet, light and well-equipped, yet it must not be hid in tortuous by-ways else the city ambulance cannot be maneuvered to its door. An x-ray machine can detect illness almost before it happens; x-rays then must be a part of all medical departments as a safety-first measure.

Even the time the doctor is to be on duty is important. He should be in his office, if possible, when men go on or come off shift so as not to waste their precious free time, but he should also be there when the executives and department heads come to discuss their problems with him. There is much more to being an industrial physician than doing physical examinations, handing out aspirin, doing paper-work, and an occasional bit of bandaging.

The returning of employees to work who have been out ill for several days is a tricky business. A weak or nervous convalescent cannot, with due regard for his physical safety, be returned to too hard a job. Before signing his card, the doctor must make sure that the work he plans to do is well within the range of his abilities and that he will not come back on a stretcher within the hour, like a groggy football player, injured in the course of a game because he was "accident prone."

Even if the industrial physician did nothing but walk through the plant with the safety engineer or the personnel director, the chances are that his recommendations would be worth his salary to management. The safety man sees safety in terms of safety records; the personnel director is more concerned with keeping the plant properly staffed; the management, try as it may, cannot take time out to lunch with each employee; but the doctor does see each man, examine each man before employment and regularly once a year thereafter. The doctor is paid by management to treat each man as an individual, a person, a human being. During that first pre-employment examination it is the doctor's job to evaluate the man not only physically but mentally. For 20 minutes he talks to the man, listens sympathetically to his past history, to his present probems, to his plans for the future. In addition, the doctor sees the employee at his lowest moments. In times of physical pain or emotional stress, the doctor is there to heal his body and to ease his tortured mind. Each year as the man grows older and symptoms of serious illness, surgical or medical, appear, the doctor is the man to whom the employee comes for help and advice. Like the doctor in the armed forces, the industrial physician lives closely with the men he cares for. Despite the

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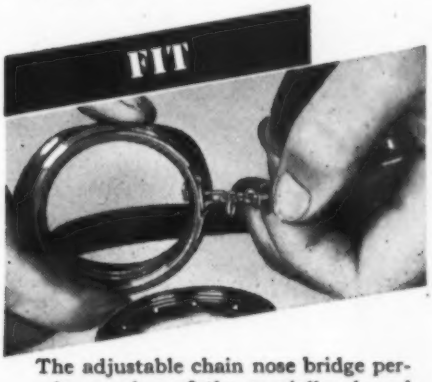

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seemingly mechanized business of healing in industry, a good industrial physician is neither more nor less than the old family doctor of horse and buggy days brought up to date. Nowadays the best friend a man has in his plant is likely to be the doctor there. The doctor is readily accessible whether the man wants advice or adhesive plaster. There are no barriers between the working man and the plant physician; no statuesque secretaries or shrilling phones. When a man wants the doctor in an industrial organization today he merely walks into his office, asks for him, and gets him.

The industrial physician has come to be a sort of human relations liaison officer between management and worker because of his knowledge of both sides of the complicated problems the individual in his own industrial plant poses. The general care of most families in need of medical attention is still the responsibility of physicians in private practice and can perhaps be left to them for many years to come so long as health plan hospitalization is offered on a low fee basis to cover sudden emergency illness, but this is not true of medical care in industry. In industry, in the daily hours of toil, men are exposed to disease, to injury and even to sudden death. Medical care in the plant is a necessity, for immediate medical attention when men are taken ill or hurt on the job can minimize illness, alleviate serious injury and even prevent death.

Every one of us industrial physicians welcomes the thought that soon there will be coming from the armed forces many thousands of trained physicians who will be able to take their places in industry and through their hard-won knowledge raise the level of health in the working population to an all-time high and perhaps because of their newer techniques reduce the accident rate still further.

Once these physicians take their places in industry the general health of the nation will be raised so that our own sons and daughters will look back on the period before 1945 as the dark ages of industrial medicine—when management was not wise enough to employ doctors in proportion to the number of their workers. If management is forward-looking, there will be a job for every returning physician who wants one. It will pay management in dollars and cents and workers in health and longevity. Next to winning the war, helping returned veterans to adjust to peace-time industry is our greatest problem. The industrial physician is trained to do this, as are the doctors in the armed forces. After all, what else have our men been fighting, working and praying for ever since Pearl Harbor made it necessary for the United States to go to war to save the democratic way of life for future generations of all races, creeds and nationalities?

Phlebitis and Burns

OTTO MEYER, M.D.,
New York City

IN A PAPER on the treatment of all degrees of burns with pressure bandages the author calls attention to the importance of phlebitis in the burned area.

The local damage to the small blood vessels in a burned area (stasis, thrombosis, transudation, and inflammatory changes) has been described by Schmaus and Herxheimer,[1] Askanazy,[2] and many other pathologists.

In the treatment of burns one important factor seems to have been consistently overlooked, namely, that the inflammation of the tissues which is caused by the effect of heat is complicated in all second, third, and fourth degree burns by thrombosis of the veins in

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the area of the burn. The thrombosis of the small veins in the burned area is found either immediately after the burn, or it develops soon afterwards. It is caused by the damaging action of the heat on the walls of the veins. We have, therefore, in every burn (except those of the first degree the treatment of which offers no problem) a thrombophlebitis of small veins in the affected area. It is of the utmost importance to prevent the inflammation of the small veins from spreading to the large, deep veins. When this happens, the patient is exposed to all the dangers of an acute thrombophlebitis of the large veins. In the extremities this may lead to occlusion of the femoral vein or subclavian vein, and to embolism. But even if these conditions which endanger the life of the patient should not develop, the patient will always be afflicted with a chronic phlebitis after the burn has healed.

The only way to prevent the spreading of the thrombophlebitis from the small veins to the large, deep veins is the application of pressure. It is not sufficient merely to apply a medicated dressing to the burned area; for, no matter how effective it may be in promoting the healing of the burn, and in alleviating pain, it will not heal the thrombophlebitis of the small veins, nor will it prevent the spreading of the thrombophlebitis to the large, deep veins. The dressing must be appled in such a way that it exerts enough pressure to remove the inflammatory congestion by promoting the circulation, and to prevent the thrombus from detaching itself from the wall of the vein. Pressure is also the simplest and most effective way to remove the pain which is due mainly to the congestion.

The ideal method of treatment for burns is, therefore, the application of pressure bandages. The author found the application of the combination pressure bandages* very effective, and he never experienced a single complication in the vascular system with this treatment. Its simplicity of application makes it especially suitable for first aid. The author applies the moist, medicated bandage loosely over the burned area. Its soothing, antiphlogistic action protects the raw surface of the burn and alleviates pain. Over this the elastic bandage is applied with strong pressure. The latter, made with elastic Vinyon E, provides even, uniform, easily controlled, and steadily maintained pressure.

The bandages are changed as soon as they become loose from the decrease of the inflammatory swelling.

Lately the author treated a printer whose ankle area had been burned with extremely hot, liquid lead, resulting in a very painful third degree burn. The patient was unable to walk. On examination of the leg with the help of Meyer's vein pressure points, the author found the deep veins infiltrated and very sensitive to pressure. After dressing the burn with petrolatum U. S. P., he bandaged the leg from the toes up to the knee with the combination pressure bandage. The patient was able to walk without pain immediately after the application of the bandages. The bandages were changed every other day. The patient was advised to walk a great deal in order to promote the return of the venous blood with muscular exercise; the decongestion of the leg was so effective that he could be dismissed after five treatments.

The prevention of thrombophlebitis is of the greatest importance in burns. Moore,[3] in a paper which deals with the prevention of thrombophlebitis in burns, states: "Of the 39 patients cared for, in this hospital,

*The medicated bandage referred to is the Contura bandage; the elastic bandage is the Pressoplast; both are manufactured by D. C. McLintock Company, Paterson 1, New Jersey.

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Detroit, Michigan

following the Cocoanut Grove disaster, five presented thrombo-embolic phenomena of clinical significance. This represents an incidence of 13%. However, of the nine patients hospitalized for a prolonged period and requiring grafts to third degree burns, four developed evidence of thrombosis of the leg veins, an incidence of about 45%. Two of these presented roentgenologic evidence of a pulmonary infarct."

Furthermore, thrombophlebitis being the basis of septicemia, its prevention or prompt elimination if already developed, is imperative. Erb, Morgan, and Farmer[4] state in their report on 61 fatal cases of burns: "In six cases of septicemia the source of the infection appeared to be in the burned area."

The author is of the opinion that complications in the venous system can be easily avoided by the application of combination pressure bandages.

Recent experiences have shown that it is not advisable to debride or cleanse the burned area before application of the pressure bandage. Cope,[5] in his paper on the treatment of burns, states: "We did not debride the burn wounds, because we were convinced that the intact epidermis over the blebs protects against the entrance of bacteria, and because bleb fluid does not become contaminated by virulent organisms harbored in gland crypts. We did not cleanse the burn surfaces, because we believe that cleansing is ineffectual in reducing significantly the number of contaminating organisms present unless vigorous scrubbing is resorted to. Such scrubbing is, it is believed, injurious to viable epithelium."

Cope recommends the application of plain petrolatum U. S. P. to the burned area before application of the pressure bandage.

SUMMARY: All burns, except those of the first degree, are complicated by thrombosis of the small veins in the area of the burn.

The application of pressure to the burned area prevents the spreading of the thrombophlebitis to the large, deep veins, prevents thrombi from detaching themselves from the walls of the veins, prevents the danger of septicemia, effects decongestion of the affected tissues by promoting the circulation, and removes pain.

The technique consists in three simple steps: first, application of plain petrolatum U. S. P. to the burned area without debridement or cleansing; second, application of the moist, medicated bandage; third, application of the elastic bandage with firm but non-constricting pressure.

References

1. SCHMAUS-HERXHEIMER: Grundriss der pathologischen Anatomie.
2. ASKANAZY: Pathologische Anatomie, edited by LUDWIG ASCHOFF.
3. MOORE, F. D.: Symposium on management of Cocoanut Grove burns at Massachusetts General Hospital. *Ann. Surg.*, 117: 801-975, June, 1943.
4. ERB, MORGAN, and FARMER: *ibid.*
5. COPE, OLIVER: *ibid.*

Correction

IN THE article by DR. A. FLETCHER HALL, entitled "The Industrial Dermatitis Problem—A Practical Approach," in INDUSTRIAL MEDICINE for February, 1945, on page 89, in paragraph (2) under "Approach to the Diagnostic Problem," the phrase which reads "during short periods of work" should have read "during short periods *off* work," the corrected paragraph being as follows: "(2) If the dermatitis has made its appearance or become markedly aggravated since the worker started in his current job, and if it has improved during short periods off work only to get worse again upon return to work, it is presumably of industrial origin and should be studied by the physician and the safety engineer."

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Three Minor Signs in Physical Diagnosis

HENRY L. ULRICH, editorial in *Minnesota Medicine*, 28:4, 310, April, 1945: "The following signs have proved of value in confirming a diagnosis and in arriving at a somatic conclusion concerning the patient.

"The first is the position of the pupil in the iris. I am speaking of normal eyes. For many years I have noted the position of the pupils, whether they are excentric to the periphery of the iris. This excentricity is usually in one eye, although at times it is bilateral. My impression is that this excentric pupil is a stigma. These people are, biologically speaking, inadequate. Patients with this type of pupil are more susceptible to morbidity. One sees this type of pupil in patients with rather severe diseases, such as lymphoblastomata, blood dyscrasias, carcinomata, etc. No statistical studies have been made to verify this impression. However, after years of observation this impression is so strong that I have the temerity to put it into print.

"Another eye sign I have noticed is the reverse Von Graefe. In the Von Graefe sign the upper lid lags as the eye turns down. In the reverse Von Graefe sign the upper lid travels faster than the eye when looking up. This sign is usually found in people who are recovering from a severe illness, such as, pneumonia, typhoid or other infectious processes. It is also found in people with neuroses. Without a history of debilitating disease, it is a diagnostic sign of pyschic disturbance. I realize either sign, the Von Graefe or its reverse, is evidence of autonomic imbalance. However, it is never seen in thyrotoxicosis.

"The third item of interest is again confined to the head. Every now and then the question of atrophy of the mucosa of the tongue arises. Often a normal mucosa of the tongue suggests atrophy because the rugae are flattened out. Rubbing the tongue vigorously with a tongue blade makes them stand up, if they are present; if atrophied, no reaction occurs."

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*Welch, Henry, and Hunter, Albert C., Method for Determining the Effect of Chemical Antisepsis on Phagocytosis, Am. Jnl. of Public Health, Vol. 30, No. 2, Feb. 1940.

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INDUSTRIAL HEALTH and DISEASE

Round Table Discussion on Industrial Health

E. J. KIRK, M.D.,
Chairman,
Omaha, Nebraska

CHAIRMAN KIRK: For the first time in the history of the Nebraska State Medical Association, I believe, there has been created a Committee on Industrial Medicine. This is the result of the growing importance of industrial medicine and its relationship to the general practice, to industry and its efficiency, and its general relationship to medicolegal matters, insurance, and compensation laws, and finally to various subsidiary bodies, including public health. Industrial medicine involves every one of us. All of us are well acquainted with its evolution and growth. We have not been too proud of the way it has been handled and perhaps some of us are not too proud of the way it is handled today. Therefore, it seems that we as an organized body should take some interest in its developments. The American Medical Association has organized a Council on Industrial Medicine and has advised all of the states to do likewise, and, up to the last record that I have seen, 45 states, including the District of Columbia, have organized such committees. The A.M.A. has put down its objectives: (1) The prevention of disease or injuries in industry by establishing a proper control over working conditions; the restoration of the worker to health and earning capacity as promptly as possible after industrial injury or disease; the conservation of health through physical, supervisory, and educational methods. In order to attain these objectives they have had to acquaint physicians with the special character of industrial medicine, surgery and hygiene; and the necessity for the enforcement of standards defining the scope and professional competency. (2) To convince employers and employees alike that medical service merits support in the industrial field, if it is organized soundly, economically, scientifically and ethically; and that to produce lasting benefits it must be satisfactory to those who provide and those who receive the service. In order to develop industrial medicine on standards recommended by the A.M.A., they have had to call upon the medical and other professional schools. They are trying to develop an educational program so that industrial medicine is taught in our colleges. They have encouraged the state and county medical societies to organize committees, and have called upon the medical specialty groups. They have advised that each State Committee on Industrial Medicine should comprise those in industrial medical practice, and those who are representing the State Bureau of Industrial Hygiene, the State Workmen's Compensation Agency, the medical faculties in the state, and insurance companies. I cannot give a definition which would cover all phases of industrial medicine. I can only tell you what my position as director of the medical department at Armour's calls for: pre-employment examinations, re-checks, taking care of emergencies that arise at the plant, seeing that these emergencies then are in the hands of capable men specializing in particular fields. An industrial practitioner may be defined as an individual who is caring for everything that occurs in relation to industry, even taking care of the non-occupational illnesses and sickness that occur. The duties of the medical service include the care for these emergencies, touching all employees who are injured or become ill on the job from whatever cause; then the continuation of the treatment of these individuals from occupational diseases or occupational injuries; and to see that the patients with illness and non-occupational conditions are sent to the local nearby physicians; the regular inspection of health and accident hazards in the plant; cooperation with the safety department and engineering department; the pre-employment examinations and the periodical examinations; the monthly physical examinations, including all laboratory work, especially for those in hazardous, poisonous environments; to maintain and analyze sickness records in order to know how and when and where the lost time occurs in the plants, and also to discover who are prone to sickness, who have "first aid-itis" and "compensationitis," etc.; to cooperate with the personnel department in the proper placement of those men who may have certain physical handicaps yet not sufficient to throw them out on society; and to make sure that employees returning to work after an absence due to illness or injury are capable of working safely and efficiently. These men are sent to their local physicians, we will say. We have an O.K. from the local physician when these men return to work. In addition, we check them and decide whether they are able to go on a tough job or if they should be assigned to a light job or if we shall try to place them where they will be safe, and more efficient. Then to promote, and take part in health education programs, and to make detailed plans for handling a large number of seriously injured in case of explosions or fire or accident of this type. I have very briefly tried to paint a picture of what the industrial setup is in general.

E. A. CONNOLLY, M.D. (Omaha): My connection is that of surgery. The relationship of the patient in those industries with which I am associated is that entirely connected with injuries they might sustain while there, and the relationship with the family physician remains the same. We do not take care of sickness, and if a person comes in who has a disease or sickness not related to his work, he is referred to his family physician for treatment and is not permitted to go to work until his doctor writes a note permitting it. Formerly when a person was examined for employment and was rejected, his family and friends would intercede and want you to certify him for the job. Just the reverse happens now. Since people have been frozen to their jobs, they get an offer

Conducted before the Annual Assembly of the Nebraska State Medical Association in Omaha, May 4, 1944; published in *Nebraska State Medical Journal*, 30:3, 90-97, March, 1945.

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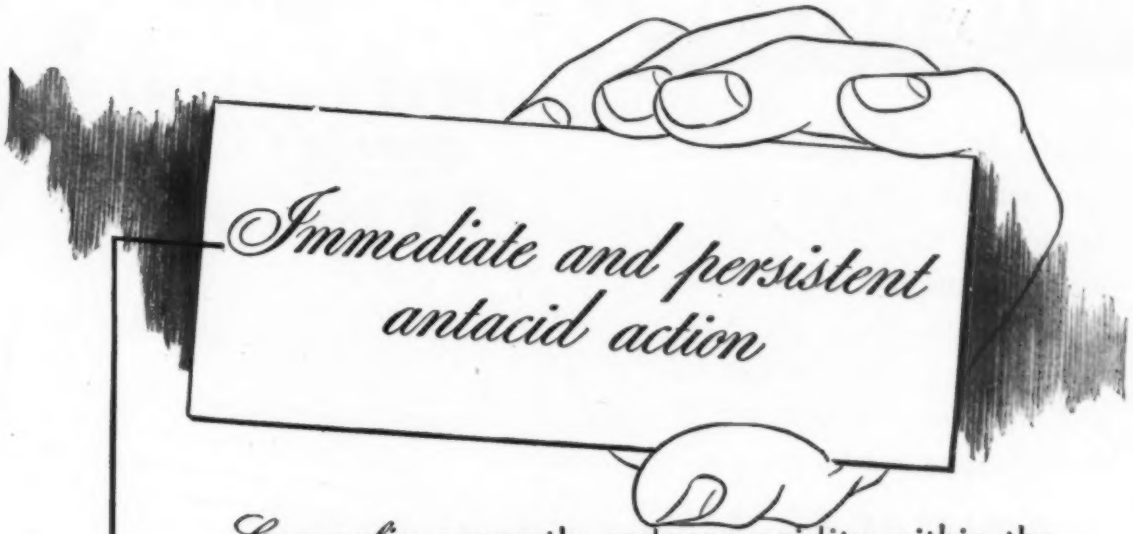

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of a better job, then they want to be released because of some alleged sickness. In cases of that kind, unless they can bring evidence from their family physician that their work or their health is impaired, they are not released for other jobs. We have this in the pre-examination: If a person has a hernia or if he has the loss of an arm or a leg or an eye, he is not permitted to go to work. That is an injustice. However, if he receives an injury, if he loses the other eye or the other arm or leg, then the company is responsible for total disability. I think that the law some way should be changed so that our decisions in court will protect us in that respect. When we go to court, of course there are at least two strikes on us beforehand, so that the decision, unless there is a statute, will always be against us. In the packing industry, with which I have had association for a number of years we have certain diseases that are common. One is an allergic dermatitis, and those people who are handling intestines, the secretions from the intestines, if they are mildly susceptible are given a protective emollient to apply before they go to work and when they quit work. If this does not protect them, then they are changed to another department. We have in the packing industry also a type of infection which closely resembles erysipelas, which is not serious and is self-limited. It doesn't seem to do much good to treat these cases; the treatment does not seem to change the infection. Occasionally ultra-violet is of some help. There are times when the management is criticized because these people who are injured are not permitted to go to their family physician. Those with minor injuries of course have to go to the physician employed if he is a full-time man. If it is of a major nature, then they have the choice of a physician. At times people say to me, "Well, here is a man who has a hernia and you repair it." If the man says he wants his family physician or family surgeon, the industry of course cannot prevent him from going there, but I don't think that the time will ever come when they will tell him that he should not go to the man of his choice. At least those that I have been associated with have not prevented him from going to the doctor of his choice. In the Cudahy Packing Company here we have a department where they manufacture Old Dutch. In those places the room is filled with a material—they claim it is not a siliceous material but it is very dusty. People in those departments are provided with masks and if they develop or show any signs of any pulmonary pathology, they are transferred to another department. The lost time accidents are of serious concern to a company, as is also lost time from any cause. The greatest reason for lost time now is the large salary that the men get for their work. After payday, there is always a large group, about 200, who are missing from work and, in speeding up industry that certainly throws a monkey wrench into the operation. A survey of the country was made at one time in the winter and about 13% of the population were having colds, and many people have advocated methods of preventing lost time from colds by the prescribing of vaccines or various things. None of these has proved successful—at least not to my knowledge. Those people who are working in certain places and are susceptible to colds, if they are standing in a draft, if there is a ventilator, if they are in cellars and have arthritis, of course we attempt to move them to a place more suitable for their health.

CHAIRMAN KIRK: DR. HILL is located at the Nebraska Ordnance Plant at Mead, and because of the peculiarity of that type of industry we are going to let him tell us anything that he wishes to tell us of interest.

RAY HILL, M.D., (Mead, Nebraska): The legislation which became law August 29, 1943, has made it imperative that physicians who have the care of industrial illnesses, pay more attention to the occupational disease phase of the problem. This revision of our compensation law was concerned solely with this problem. Up to this time Nebraska had had occupational

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disease coverage on a few specific industries, but now the legislation is complete enough that it covers practically all industries. The industrial dermatoses, while not so important from a compensation viewpoint as occupational illnesses of other types, are still a major problem in those industrial concerns where the materials handled cause skin irritation. They are important because of labor turnover, an occasional compensation case and the general effect they have on the mental attitude of the employee as they usually occur early in the employment period. *Diagnosis:* The approach to a diagnosis must be made in the same way that one would handle any medical problem. First a history must be obtained, and in this history the physician must ascertain the type of work the employee is doing, the length of time he has been on this job, and at the present time it is especially important to ascertain what the employee does away from the job, as it is not uncommon to find employees following an additional occupation away from the plant, which would carry the possibility of complicating the diagnosis. Inquiry should also be made as to the past history of an employee. Occasionally one will uncover a story of a previous rash or dermatitis which has no possible industrial connection, or the pre-employment examination and history will reveal past episodes that definitely have a bearing. *Location of the Eruption:* An occupational dermatitis usually begins on the exposed parts of the body; that is, the hands, the fingers, the forearms or the face. However, if the irritant happens to be a vapor or a very fine dust, you may find characteristic lesions elsewhere. Coarse dust will frequently cause a dermatitis at points of friction; for example, at the cuff of the sleeve, at the belt line, the top of the shoe, or where the neck of the garment rubs across the shoulders. *Differential Diagnosis:* After the physician has ruled out the possibility of origin of the causative irritant away from the job, then the other common skin conditions which must be considered are impetigo contagiosa, seborrheic dermatitis, pityriasis rosea and fungus infections. These are the most common skin problems that one must differentiate, and there are, of course, others. Fungus infections cause us a great deal of trouble, especially when there are numerous dermatophytid formations over the hands. These resemble very much the typical TNT dermatitis that develops after a few days' exposure. Dermatitis venenata due to a drug sensitization has occasionally caused us trouble, as have poison ivy and scabies. *The Patch Test:* I mention the patch test merely to state that information from this test is to be used only in a corroborative way. The patch test is not a mechanical means of getting all the answers to the problems of occupational dermatitis. It must be used in a sensible manner as an adjunct to the history, clinical picture, and all other information obtainable. *What do TNT and tetryl do to the skin:* We have found that a small percentage of all employees who come in contact with explosive dust develop a dermatitis. This happens in from one to three weeks after the initial contact and is usually over the exposed areas of the body or at the points of friction. We have found that, by keeping the employees in contact with explosive powder, after a period of from one to three weeks the dermatitis will disappear in practically all cases. We do not regard this as a true allergy because, by keeping the employee in contact with explosive dust, the skin becomes "hardened" so that the irritant no longer has any effect. However, there is an occasional case that reacts in a typical allergic manner, with a marked reaction over the entire body and mucous membranes. The hands and feet are edematous, the eyes are swollen shut and the face generally is very greatly swollen. This marked reaction probably does not occur more than once in every 1,200 cases of dermatitis. When such a case does occur, we find that it is inadvisable to attempt to "harden" the skin of such an employee. At the present time we are noting that employees previously "hardened" and removed from the job due to a change in manufacturing procedure, are suffering a recurrence of their dermatitis when exposed. There is a rather interesting example

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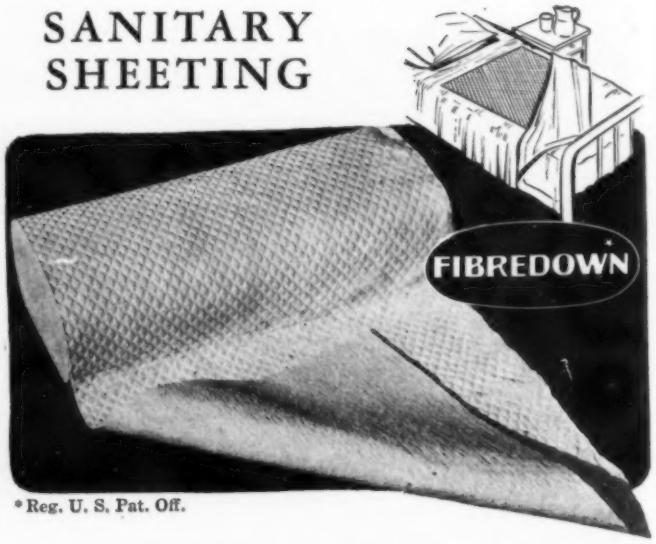

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of what can happen even in a severe case of allergy, in the case of Gus. This man came to work for us when the plant was first opened, and was transferred to contact with TNT after he had been here a few weeks. Within a week he was brought to the hospital with marked swelling over his entire body, his feet swollen to the extent that it was impossible for him to put on his shoes, his hands and fingers swollen until he could not bend his finger, and his eyes completely shut. If we were to see a case like Gus at the present time, we would immediately remove the person from contact with TNT, but we were inexperienced then and returned him to contact with TNT after about four days' treatment. Within 48 hours his condition had returned and was as bad as, or worse than, it was when he was seen originally. Following this we told him that he would not be able to return to his former job. This man was quite intelligent, and after informing the management of his difficulty, they evaluated him and he was made a foreman in a building in the line where there was no contact with TNT. In our conversations with him, it was mentioned that he might possibly become "hardened" with minute contacts with the irritant over a long period. Because of this conversation, every time he had an opportunity he would pick up a little TNT and let it sift through his fingers, and he would spend a short period in one of the buildings where there was some contact with dust in the air. In October, 1943, 10 months after his original difficulty, he was transferred as foreman to a building where there was continual exposure to TNT dust. This man has had no difficulty in any way since then, and we see no reason to think now that he will have any further trouble. *Role of the Industrial Physician:* The industrial physician, when dealing with occupational diseases including dermatitis, is chiefly concerned with prevention. In a plant such as ours we have attempted to approach the problem of prevention first from the standpoint of cleanliness; second, maintenance of a healthy intact skin, and third, the removal of the irritant from the employee by mechanical means. Cleanliness is made possible by daily showers, the use of special soaps and the provision of a complete set of clean clothes each day. The care of the skin is emphasized with the worker, and an oily preparation is provided to apply after each bath, to help the worker who does not have enough oil in his skin to compensate for a daily bath. It is our opinion that ventilation will help in dermatoses problems by the removal of the causative agent. This will also be a big help in the problem of other occupational disease. *Tetryl:* This substance will sensitize and cause dermatitis in from 10 to 15% of the workers in from 10 to 14 days after the first exposure. The dermatitis from tetryl usually appears on the thin skin of the wrist and forearms, the skin at the side of the nose, beneath the eyes, along the hairline or beneath the jaw. The election of these areas on the face is no doubt due to the difficulty in proper cleansing of the uneven surfaces of the face. This is an erythematous fine papular type of dermatitis. In the majority of cases it will disappear in from one to three weeks. We provide protective ointments for these employees which is made of glycerine, stearic acid, sodium carbonate, tragacanth and water. It is my opinion that the greatest benefit from this protective ointment is that it is something that the employee puts on which later he has to wash off, thereby adding a factor which insures cleanliness. The hands and other portions of the body coming into contact with tetryl will be discolored, and will appear yellow or yellowish brown. The hair is stained also. It is interesting to see the girls with a wisp of hair sticking out from under their bandanas so that it will change in color. In munition plants they are known as tetryl or canary blondes. This staining has no more significance than the brown discoloration of the skin from hulling

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walnuts, which most of us did when we were children. *TNT:* This causes a dermatitis which appears in from seven to 14 days after exposure, and persists for a period of from two to three weeks. This usually appears over the hands, wrists and forearms, as well as the points of friction such as around the collar, the belt line and the ankles. The lesions in the palms are quite similar to the appearance of the blood-borne fungus infections. As the lesions subside, the skin peels in large thick pieces, usually leaving new skin underneath. The dermatitis developing on the wrists and forearms is erythematous with papules, and the papules are larger than those mentioned in connection with tetryl. Treatment consists of the use of calamine lotion, aluminum acetate or other soothing lotions until the skin becomes hardened to the irritant. Accompanying this treatment there must also be an educational program, so that the employee is made aware of the problem involved in the care of his skin. *Other Dermatitis Problems:* We are confronted from time to time with problems other than the ones that you would ordinarily expect to find. One such problem that we have frequently, especially in the summer months, is poison ivy among our ground-keepers. During construction, we had many cases of skin irritation from cement, and will still occasionally run into a laborer who presents a dermatitis after doing some repair work where he is exposed to the fine dust from cement. The dermatitis cases that arise in employees who clean box cars are often impossible to diagnose as to the causative agent. We think that the majority of these probably come from grain dust. In handling large groups of people such as the employees at the plant, group reactions must continuously be taken into consideration when medications or materials for daily use are given. Materials must be provided which the employees will use without too much pressure. We have tried a lanolin vegetable oil mixture to combat the excessive dryness of the skin from frequent bathing, and have found that the employees will not use this routinely because it is too oily. Unless one meets these problems, your preventive lotions, ointments, etc., will not be used and your program will be defeated.

CHAIRMAN KIRK: You have heard the remarks concerning the organization and plan of industrial medicine and discussion concerning problems that have occurred as described by DR. CONNOLLY and DR. HILL. At this time we want to throw the meeting open to a discussion in general. We want you to feel free to discuss any phase of industrial medicine in a brief way, or to ask any questions that you may have.

W. J. PINKERTON, M.D.: Having had some years of experience with industrial work—not as a surgeon; I am not a surgeon—with the public health service and with a large steel company, I have watched with great interest the development of industrial medicine in addition to industrial surgery, and I am very glad to know that this subject has been taken up in this manner today. Nebraska has not been a large industrial center. Previous to the war industry came here very little, but it has developed in the last few years on the industrial side, greatly.

R. W. FOUTS, M.D. (Omaha): We are not so proud of industrial medicine, or perhaps not all of it is all that is desired. I am wondering if you'd care to answer the question as to whether or not you were referring to that part of industrial medicine as practiced by the general man or the surgeon caring for industrial compensation cases, or if you more particularly had in mind the contract practice of industrial medicine.

DR. KIRK: The development of industrial medicine was a slow process. First, many industrial plants had just a kit with a little iodine or a few implements, and first aid service was rendered by some fellow workman. This continues even at the present time. There are many small organizations in Omaha today that have a small kit from which they brush the dust off once in a while and open it and paint some antiseptic on the injured victim. There is still employment without examination, and a hit-and-miss problem of handling the industrially injured. We have seen the growing development within the plant, perhaps, first care being taken and offered by safety men and

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safety engineers, and then it developed to where the nurse came in as a full-time employee; followed by part-time doctors and full-time doctors with staffs of great complexity in some localities. There are misunderstandings — between the industrial medical man and the local practitioner. We who are in industrial medicine and in general practice must realize that there are two sides in caring for the sick. I feel, however, that here at least it is not a serious problem. I referred very briefly to the care of non-industrial illnesses. Personally, I don't think in this locality we need to do that. Where DR. HILL is, where people are moving in from all over the country and have no local physician, and local physicians are scarce, then it is very necessary that the plant physician care for the families and children of the industrial employees, but in general, I think the industrial medical man should be very careful in prescribing and caring for the ill, the non-industrially ill, person.

R. W. FOUTS, M.D.: I think you answered my question very well. I was interested in knowing your personal reaction. I'd say, that it is a lot of satisfaction to me to see the improvements in industrial medicine in Omaha, and particularly the contract practice of medicine. I am interested in seeing competent men heading those institutions. I have known some institutions in the past, and I think we still have some of them with us, where though they call it industrial medicine it isn't industrial medicine at all. It is a type of practice that is certainly not good for medicine when, as the employees file out from the plant at night by the hundreds, they will go by and pick up a bottle of cough medicine. It's a big job to keep the little bottles filled these days! They can pick up sulfathiazole, headache powders or tablets or laxatives. It is there, labeled, a half dozen tablets or an ounce or two, depending on what it is, prepared by these people by the score during the day to pass out at night. That is the type of practice that develops in too many of our industrial plants. That is not good medicine. It is—well, it's the worst kind of practice, in my opinion. As I say, it is a pleasure to note that we are getting some real men who are thinking for the good of medicine as well as industry. I think the two go hand in hand, and that is the type of practice that formerly was indulged in to some extent, and still prevails in some instances.

DR. KIRK: Along that same line, when I first went to the plant in which I am now working they had quite a dispensary and a great display of drugs, cough syrups, etc. We got wise to ourselves, not because it wasn't good medicine; we didn't realize that, particularly. We discovered that these people were getting aspirin and cough medicine and taking it to the neighbors! We were really taking care of everybody living in that vicinity. Well, we don't do that any more. We have one problem, for instance — that of vaccination. Who is going to do the vaccination of all these 2000 to 4000 or more people who work in these plants? Our practice is to send them to the local physician. That would be time-wasting and inefficient in certain plants and in certain organizations. We don't want to take the risk of poor technic, perhaps, or law suits that might come from a very sore arm. Our relationship to the legal profession is very touchy. In fact, you know these industries now have their own legal departments; it is a protection. We have great trouble with the influence of neighbors on people who are injured. A man will go home from a plant injured—it may be trivially. But he is influenced by his neighbor to start a law suit. Industry must have an organized medical department. How this medical department shall work with its fellow physicians is another question but I think it is ironing out very well. A better understanding is coming between the local physician and the industrial man and cooperation is seen more today than it

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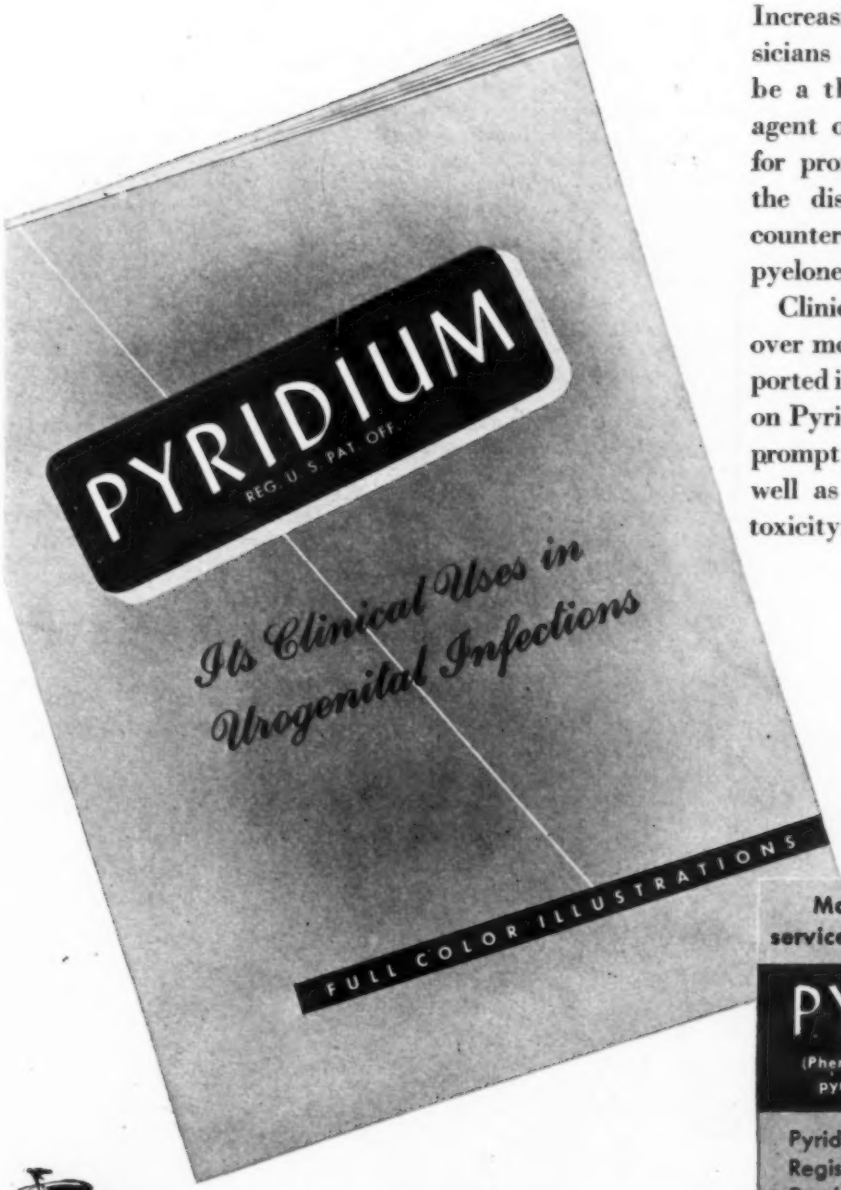

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ever was before, and I can remember that from past years of experience. Every man we put in a hospital would mean a battle and a lot of bad feelings because of family influence and the like. But a better understanding of the public in relation to industrial medicine is certainly coming at this time.

R. D. SCHROCK, M.D. (Omaha): We see not so much the end results of injury or the end results of disease but the end results of industry's inability to recognize the fact that horses are built for quarter-mile races and other horses are built to carry an exhibition wagon in the Coliseums thoughout the country for advertising purposes, and that still other horses are built to replace the tractors when they break down. By that I imply the lack of attention of industry at the present time to adjust the physical and mental make-up of the employee to a particular task. We see a fair number of low back problems, some of which are explainable on a definite basis. We could say, "There is the difficulty." There are others in which we can see clinically very little, on examination of the patient, except that we have an asthenic individual, maybe small or large in stature, with a mental attitude of ineffectiveness. Many of these individuals have been doing hard work. When they get to middle age— that is at 35—their musculature begins to deteriorate more rapidly than normal; they are unable to carry on with that very heavy type of work. They break down. Their history is of greater significance than is their physical examination, and we are running into more and more of that type of individual who requires a readjustment of physical activity. Now, from the viewpoint of industry, a practical problem is presented because they cannot make readjustments in their employment practice to put a man who is beginning to deteriorate physically into a lighter job. It is not a critical attitude that I present toward industry; it is a practical problem that industry will have to meet. The discharge of those individuals at the beginning of their breakdown would be really an excellent investment for industry. Otherwise, they are faced with the problem of paying continuous compensation over a long period of time, and the physician in charge of that plant suffers mental anguish as these ineffectives come into the office day after day. They can't work on account of pain in the back. They are overloaded, some of them physically and most of them mentally, and unfortunately during the past few years the mental desire to be self-supporting has been materially undermined by various influences.

DR. KIRK: This point is well taken. It is a very important problem. We are experiencing much trouble along this line. We have four classifications in our examinations, A, B, C and D. I have told my personnel department time and time again that there should be only two classifications, A and D, because the C man who has a defect and who should be placed on certain jobs is finally thrown out into the plant and becomes lost in the shuffle, and the first thing you know he is on a job where he shouldn't be.

DR. MCARDLE: Mr. Chairman, if I may say a word, I represent the Glen L. Martin Nebraska company, a baby industry here in Omaha, making aircraft. In attempting to overcome the difficulty you have just mentioned, classification for substandard risks, we use an A, B, C and D rating. We don't allow anybody in the plant to have those physical ratings on our employees except one man in the industrial relations department, and before a transfer is in order he passes on every case. He draws a card on that man so he knows what his risk is. If he has an A rating, as far as we are concerned he is eligible to work in any place on the reservation. If he has a B or C rating, then he is sent to the medical department, is examined; his job is analyzed as to the amount of both mental and physical requirements it will take, and if I deem it necessary, he is allowed to go on that job. If not, he is sent back, the reason is told to the man as to why he can not take that job, and an attempt is then made to re-establish his transfer and see if we can't place him where he can be better handled. You spoke of the fact that you feel we should have either A or D. Here is something that I am facing every day and these men definitely are not A's or C's or D's. We are getting back our certified discharged men from our army and navy. We set up this precedent of A, B, C or D, so that we could better handle these boys who are coming back from the service, or the 4 F's. One other point

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1. J. A. M. A. 125: 612-616 (July 1) 1944
2. J. A. M. A. 125: 536-543 (June 24) 1944
3. Ann. of Surg. 117: 885 (June) 1943.

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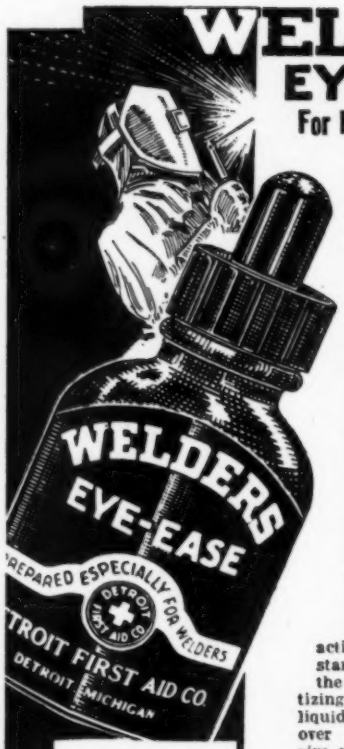

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Industrial Hygiene News Letter

—Current News of Official Industrial Hygiene Activities—

INDUSTRIAL HEALTH EMPHASIZED AT ANNUAL MEETINGS OF STATE HEALTH AUTHORITIES: Industrial health was prominent in the many discussions which took place at the 43rd annual meeting of the State and Territorial Health Officers with the Surgeon General of the U. S. Public Health Service, held April 9-11, as well as at the 60th annual meeting of the State and Provincial Health Authorities of North America on April 13. At the opening session of the conference, MR. F. L. MCNAMEE, Deputy Commissioner of the War Manpower Commission, stressed the valuable aid which had been given by the Industrial Hygiene Division of the U. S. Public Health Service and the various state and local industrial hygiene units in controlling hazardous conditions in critical war industries, thereby assisting materially in the stabilization of manpower in such industries. MR. MCNAMEE cited various dramatic examples of this type of service, especially with reference to such critical industries as production of ethyl gasoline used in air warfare, lead smelters, forges and foundries, chromium industry, and in aluminum reduction plants.

Industrial Hygiene Progress Reported: At the meeting of the State and Provincial Health Authorities, DR. S. H. OSBORN, Connecticut State Commissioner of Health and Chairman of the Conference's Industrial Health Committee, reported the progress made in this field for the year 1944. DR. OSBORN discussed the importance of pre-placement health examinations, which gained recognition during the year, particularly as a guide in the placement of the disabled veterans and handicapped workers. Labor's growing interest in industrial hygiene, and the promotion of good health and working conditions by labor-management committees, were commented upon favorably by DR. OSBORN. He reported developments during the year in the control of health hazards connected with munitions, radioactive materials, welding fumes, and other processes. Progress in the development of aluminum therapy for silicosis and in industrial noise control were discussed. He reported an 11% increase in state and local appropriations for industrial hygiene work. Of the total money expended in 1944, $1,246,538, state and local funds accounted for 48%, as compared with 37 in 1943. "Your committee feels it vitally important that funds be provided for increased industrial hygiene activities in the post-war period," he declared. "Since Title VI (Social Security Act) funds will not be sufficient for this purpose, your committee re-

Issued monthly by the Federal Security Agency, Industrial Hygiene Division, U. S. Public Health Service, Bethesda 14, Maryland. The foregoing is No. 4, of Vol. 5, April, 1945.

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quests that you give serious consideration to the formulation of measures which would enable the states to obtain funds for this purpose through direct Congressional appropriation."

Need for Expansion Emphasized: In discussing DR. OSBORN's report, DR. TOWNSEND, Chief of the Industrial Hygiene Division, U. S. Public Health Service, pointed out that wartime processes of industry have given rise to many serious industrial health problems, and that reconversion to peace-time production will accentuate rather than reduce such problems. As a result, he said, all phases of the industrial hygiene program must be intensified and expanded. The services of the Federal industrial hygiene organization to the state and local units were described, and the Division's cooperative activities with other Federal agencies in the health protection of war workers were explained. Plans of the Public Health Service for extending health services in industry, especially in smaller plants, for better engineering control of environmental hazards, intensification of industrial nursing, dentistry, mental health, and health education activities, and for the training of professional personnel in industrial medicine and hygiene, were described by DR. TOWNSEND. If these plans are made effective through legislation, DR. TOWNSEND said, the Public Health Service proposes to appoint a national advisory commission on industrial health which would include representatives of management, labor, the medical profession, and public health. Recent legislative action by several states establishing industrial hygiene units in state health departments or appropriating funds for such services was reported.

Industrial Hygiene Resolution Passed: The various discussions on industrial hygiene which took place at these conferences were climaxed by the passage of a resolution which would provide increased support for industrial hygiene activities through Congressional appropriation to the Industrial Hygiene Division of the U. S. Public Health Service. The text of the resolution follows: "Whereas industrial hygiene is an important part of public health activities which not only prevents the adverse effect of certain industrial environment upon the working population, but also, because of the close association with this large group which industrial hygiene activities entail, presents an unequaled opportunity to bring to this important group of our population the various facilities provided by public health authorities, and Whereas there should be no diminution in industrial hygiene work after the war, but that there should be an increase in this phase of public health work, and Whereas state aid for industrial hygiene activities is now provided through funds furnished by Title VI and some Lend-Lease activities, which it is expected will be considerably decreased after the war, It is therefore Resolved by the Association of State and Territorial Health Officers that an appropriation for state aid for industrial hygiene activities be provided through the Industrial Hygiene Division of the U. S. Public Health Service by direct Congressional appropriation."

TWO-YEAR REPORT OF INDUSTRIAL HYGIENE UNITS' WORK RELEASED: Summarizing the work of all governmental industrial hygiene agencies in the Nation, a paper titled "Official Industrial Hygiene Services," by VICTORIA M. TRASKO, Statistician, has just been released by the Industrial Hygiene Division, U. S. Public Health Service. It is published in the April issue of INDUSTRIAL MEDICINE. Telling a story of impressive achievement in spite of heavy handicaps due to insufficient trained personnel, the report covers the period July, 1942, through June, 1944, and portrays the activities of 44 official units which reported during that time. It is based upon data of individual plant investigations submitted regularly by the units to the Public Health Service. War industries received major attention from the industrial hygiene agencies during the period covered, especially those referred for investigation by the War Manpower Commission and other Federal agencies, where health hazards were thought to be responsible for production lags and manpower difficulties. Industrial hygiene services were given to 23,685 establishments employing over nine million workers

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To compensate for this greater energy expenditure, dietary habits must be adjusted too. Usually the total food intake must be stepped up, so that nutritional deficiencies may be avoided. With many elderly workers, breakfast particularly is the neglected meal.

A good breakfast to advise is one of fruit, cereal (ready-to-eat or to-be-cooked) with sugar and milk, toast and butter, an egg or two or a breakfast meat, and a beverage.

The nutritional contribution to this breakfast made by the dish composed of 1 oz. of cereal (whole-grain, enriched, or restored to whole-grain values of thiamine, niacin, and iron), 4 oz. of milk, and 1 teaspoonful of sugar, is shown by the appended table of composite averages. The ease with which cereals are digested is appreciated by the elderly worker.

BASIC BREAKFAST:
Orange juice, 3½ oz.; Cereal, 1 oz., with milk, 4 oz., and sugar, 1 tsp.; Bread (enriched, white), 2 slices, with butter, 10 Gm.; Coffee with cream (20%), 2 tablespoons (30 Gm.) and Sugar, 1 tsp.

	TOTALS	AMOUNTS supplied by cereal, milk, and sugar dish	PERCENT represented by cereal, milk, and sugar dish
Calories	567	201	35.4%
Protein	13.5 Gm.	7 Gm.	51.9%
Calcium	252 mg.	158 mg.	62.7%
Iron	2.73 mg.	1.73 mg.	63.4%
Vitamin A	1042 I.U.	193 I.U.	18.5%
Thiamine	0.44 mg.	0.19 mg.	43.2%
Riboflavin	0.47 mg.	0.27 mg.	57.4%
Niacin	2.58 mg.	1.82 mg.	70.5%

The presence of this seal indicates that all nutritional statements in this advertisement have been found acceptable by the Council on Foods and Nutrition of the American Medical Association.

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2 Cleansing is done with FOAMING OIL SKIN CLEANSER, a *sulphonated vegetable oil* mixed with a wetting agent. It is an *efficient cleansing compound* that helps preserve natural skin oils—as it provides additional beneficial oils for the skin to help build up resistance to drying or chapping both on and off the job.

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in 34 states. They included mines, quarries, construction projects, transportation and other public utilities, many types of manufacturing establishments, laundries and dry cleaning plants, garages, office buildings, and other places of employment. In size they varied from a granite shed employing three workers to aircraft plants and shipyards with 50,000 or more employees. Inspections, general industrial hygiene surveys, special engineering and medical studies, and consultation on a variety of special problems were performed by some 300 professional personnel consisting chiefly of physicians, nurses, engineers, chemists, and sanitarians, including about 60 persons on assignment from the Industrial Hygiene Division, U. S. Public Health Service. There is detailed analysis of the various types of industrial hygiene services performed, as well as services given by these agencies in dealing with outbreaks of nonoccupational disease in industry.

ANTI-MILDEW INFORMATION RESTRICTED: Information about results of toxicity tests conducted by the Industrial Hygiene Division, U. S. Public Health Service, on various chemicals used for anti-mildew processing of fabrics for the U. S. Army, can be made available only to accredited governmental agencies, it is announced by the Office of the Surgeon General, Army Service Forces. Civilian agencies working under war contracts which desire information on this subject are requested to refer their inquiries to the War Department agencies with which they are associated.

SIGHT SAVING IN INDUSTRY PROMOTED BY COLUMBIA COURSE: With the cooperation of the National Society for the Prevention of Blindness, Columbia University, in New York City, is giving a course in industrial ophthalmology May 7-11. Various phases of sight saving work in industry will be presented by a number of outstanding authorities. SURGEON (R) WALTER E. DOYLE, Chief of the Medical Unit, Industrial Hygiene Division of U. S. Public Health Service, will attend. Extension of sight saving programs in industry is proving of great value to workers and management, declared DR. JACK MASUR, Acting Chief Medical Officer of the Federal Office of Vocational Rehabilitation, in a report recently published. "The war crisis emphasized the importance of sound industrial hygiene practices for the conservation of vision. There was a vast number of new workers unaccustomed to modern machine tools, an increasing use of older workers with diminished vision," the report said. "A survey of 50 plants employing 166,682 workers revealed that only 10% reported they had performed job analyses for visual requirements. Less than a third of the plants offered visual examinations. Only 14% pro-

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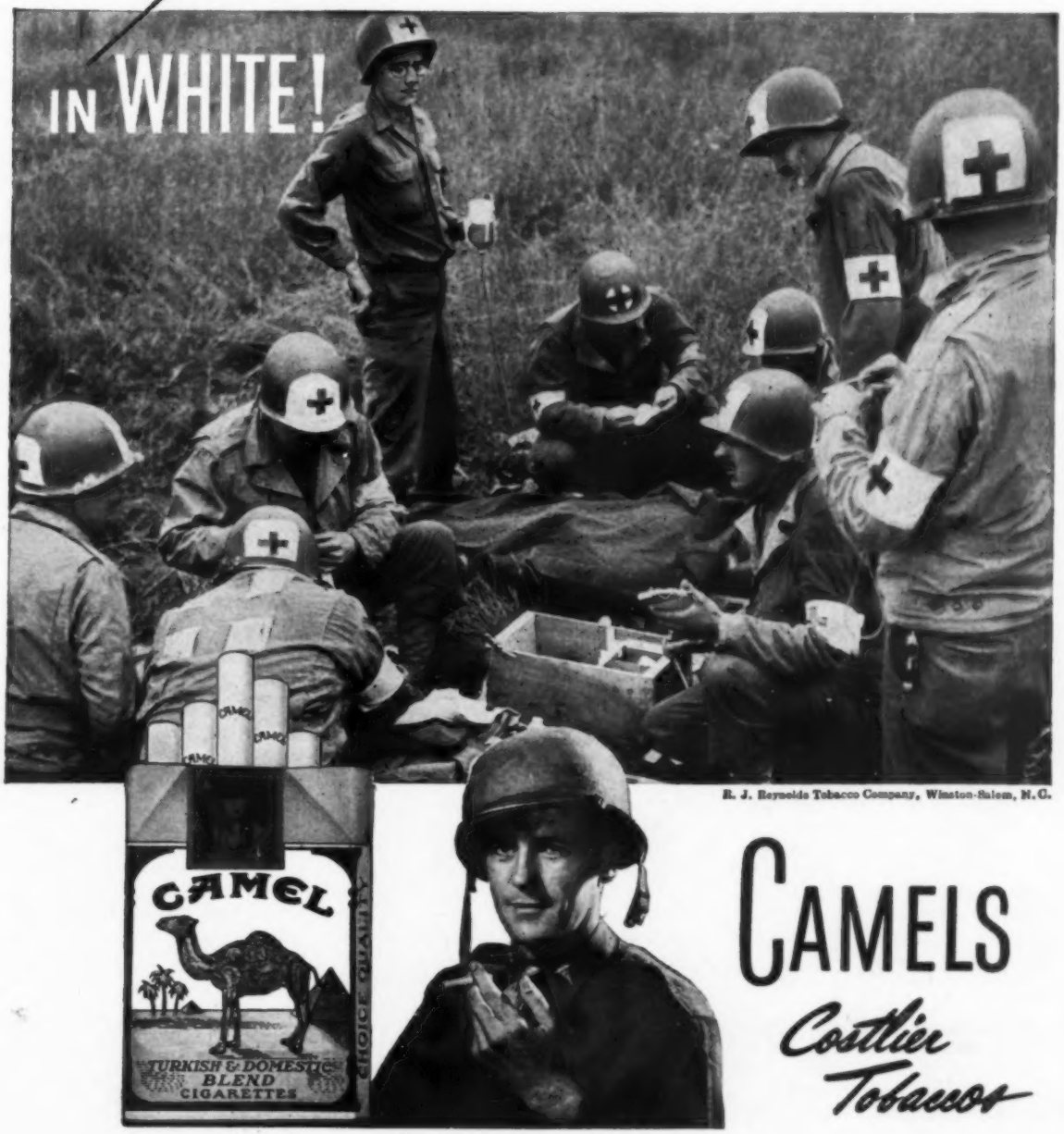

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vided periodic eye examinations. In reports of accidents to safety departments, only 22% included a report on the eye condition of the person involved and only 12% made reference to illumination at the site of the accident. The latter points are particularly interesting since it is believed that at least one out of every four accidents in industry is related to faulty vision or poor illumination."

MUNITIONS WORKERS ACHIEVE SAFETY RECORD: Management and workers of the Powder and Explosives Division of the Western Cartridge Company plant at East Alton, Illinois, were congratulated recently by SURGEON GENERAL THOMAS PARRAN, U. S. Public Health Service, on achievement of an extraordinary health and safety record, in a letter which he wrote to MR. JOSEPH D. KEENAN, Vice-Chairman for Labor Production, War Production Board. It was reported by MR. KEENAN that this plant has completed 520 days (771,000 man-hours) without a single disabling injury. The safety and health drive received the enthusiastic support of all employees, members of the International Union of Chemical Workers (AFL) Local No. 6, according to the report.

STATES' COOPERATION ASKED IN LEAD SMELTER STUDY: Cooperation of 22 state industrial hygiene units has been asked by DR. J. G. TOWNSEND, Chief of the Industrial Hygiene Division, U. S. Public Health Service, at the request of the War Manpower Commission in a drive to reduce or eliminate health hazards in the lead smelting industry and to reassure workers as to the safety of employment in that industry. Production in 50 critical primary and secondary lead smelters recently has become particularly urgent and important to the war effort, declared EUGENE C. BEWKES, Director of the Bureau of Manpower Utilization of the War Manpower Commission, in asking the help of the Public Health Service and state industrial hygiene units toward clearing up hazardous conditions in these smelters. Lead poisoning hazards are believed to exist in some of these plants, particularly in the secondary lead smelters. State industrial hygiene bureaus have been asked to cooperate in this investigation in order to ascertain what hazards exist and to recommend methods of solution. Continuous contact with management of these plants and with WMC regional offices is desired to assure carrying out of the industrial hygiene recommendations. To alleviate the fear of lead poisoning which has been causing difficulty in the recruitment and retention of personnel, information on the safe conditions of plants where surveys and resurveys have shown elimination of hazards will be made available to personnel directors and union officials, and publicized through local newspapers.

ARKANSAS ADOPTS SANITATION CODE: An example of close cooperation between a state health department and a state industrial commission is demonstrated by the code of "Rules and Regulations Pertaining to Environmental Sanitation in Manufacturing Establishments" adopted in Arkansas and issued under the imprint of the State Board of Health. This is considered an outstanding example of constructive results which may be obtained through a good working relationship between state departments having responsibility for health and safety.

HEALTH AND SAFETY DRIVE IN MEAT PACKING INDUSTRY SUCCESSFUL: State health departments, which cooperated with the U. S. Public Health Service and the U. S. Department of Labor in a drive last year to reduce accidents and promote health in the slaughtering and meat packing industry, will be interested to learn of the substantial drop in accidents and sickness among employees. The Bureau of Labor Statistics announced that during the last half of 1944, at least 1,700 disabling injuries and illnesses and 51,000 non-disabling injuries and illnesses were prevented. This is interpreted to mean a direct saving of 34,000 man-days of productive labor, and a saving of $2,252,000 to the industry and $204,000 in wages which otherwise would have been lost. These statistics were obtained through comparison of accident and illness reports before, during, and after the campaign.

ALLYL RESIN HAZARDS STUDIED: In line with the policy of the Industrial Hygiene Division, U. S. Public Health Service, to investigate potential hazards connected with new chemicals used by industry, an investigation has just been made in a large Pennsylvania glass plant of the possibilities of dermatitis in the manufacture of allyl resins, synthetic sub-

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stances used in laminating wood, paper, and glass. The study will be conducted in a plant where these resins are used in various processes of glass manufacture.

PROTECTIVE CREAM PROVES VALUE IN DERMATITIS STUDY: Poison ivy protective cream developed previously by the Dermatoses Section of the Industrial Hygiene Division, U. S. Public Health Service, was found to be an effective protection also for persons working with cashew nut shell oil, used in the manufacture of varnishes and resins in a New Jersey plant.

FEDERAL EMPLOYEES' HEALTH SERVICE PLAN PRESENTED: A plan prepared jointly by the U. S. Public Health Service and the Medical Division of the U. S. Civil Service Commission to cut down absenteeism due to illness among Federal workers was presented by SENIOR SURGEON JOHN W. CRONIN, of the Public Health Service, at a meeting of the District of Columbia Medical Society March 29. Under this plan, an integrated health protection program involving preventive services, advisory and diagnostic services and treatment would be made available to all Federal employees through a series of health units established in the Federal agencies and departments. DR. CRONIN stressed that the plan would apply the industrial hygiene approach used by progressive industry to Federal employment. Pre-placement and other physical examinations, promotion of adequate environmental hygiene, control of communicable diseases, mental hygiene work, and health education are among the features recommended.

INDUSTRIAL PRACTICES CREDITED FOR DROP IN DEATH RATE OF WOMEN: Industrial hygiene and safety programs in industry are credited with partial responsibility for the substantial drop in the death rate of women by the Metropolitan Life Insurance Company statistical service. According to its figures, the death rate from all causes for insured women fell by one-sixth between 1939 and 1944. Provision by industry for the special needs of women workers, medical programs, and the development and enforcement of safeguards such as proper work clothing, restriction against heavy lifting, care of pregnant women, and control of environmental hazards are said to have contributed to the decline of the mortality rate of insured women.

MANAGEMENT-LABOR COMMITTEE SPONSORS HEALTH PROGRAMS: Health information will be brought to workers of a California shipyard at lunch hour in a series of programs sponsored by the labor-management committee with the cooperation of a number of state, local, and union health agencies. Among the speakers will be DR. HAROLD T. CASTBERG, Chief of the Bureau of Adult Health, California State Department of Public Health.

INDUSTRIAL HYGIENE DIVISION MOVES OFFICE: On April 6, the outlying offices of the Industrial Hygiene Division, U. S. Public Health Service, moved into Building 3 of the National Institute of Health, at Bethesda, Maryland. With this move the entire Division, with the exception of the Chemical Unit, is now housed in one building.

TOXICOLOGY CONSULTANT AVAILABLE TO STATES: DR. LAWRENCE T. FAIRHALL, Principal Toxicologist with the Industrial Hygiene Division, U. S. Public Health Service, is now available to state industrial hygiene units for consultation upon toxicologic problems. DR. FAIRHALL will assist in field studies conducted by the Industrial Hygiene Division, and will go to areas where assistance is requested by the States.

ANNIVERSARY OF INDUSTRIAL NURSING CELEBRATED: The Minnesota State Organization of Public Health Nursing held a dinner meeting on April 7 in celebration of the fiftieth anniversary of the establishment of industrial nursing as a profession. MR. J. J. BLOOMFIELD, Assistant Chief of the Industrial Hygiene Division, U. S. Public Health Service, talked to the group on "New Horizons in Indus-

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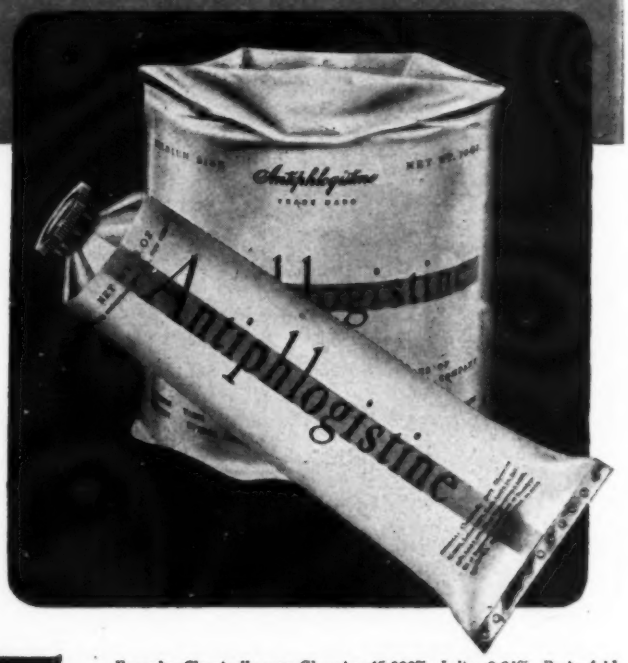

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trial Health," in which he discussed the growth of industrial nursing and hygiene over the past 50 years and the needs for further development in these fields. This paper is published in the April issue of INDUSTRIAL NURSING.

NOISE ABATEMENT WEEK: Elimination of unnecessary noise in and out of industry, as a contribution to the war effort, will be promoted April 29 to May 5 by a National Noise Abatement Week, sponsored by the National Noise Abatement Council. Two Colgate University psychologists have been assigned to conduct extensive surveys of the effects of noise and noise reduction in manufacturing establishments in six eastern states, announces the Council. They will study the effects of reduction of noise on health, accidents, speed and quality of output, absenteeism, employee turnover, and general morale.

DATA ON THE AIR-BORNE CHARACTER OF VARIOUS COMMUNICABLE DISEASES: Articles on the air-borne character of various communicable diseases, particularly those dealing with methods of analysis and control, originally printed in the *American Journal of the Medical Sciences* and written by the Army, Navy, U. S. Public Health Service, and other medical authorities, are available in pamphlet form at the Industrial Hygiene Research Laboratory, U. S. Public Health Service, Bethesda, Maryland. The pamphlet includes the following articles: Atypical Pneumonia; Factors in the Control of the Spread of Acute Respiratory Infections with Reference to Streptococcal Illness and Acute Rheumatic Fever; Scarlet Fever as an Air-borne Infection; The Transmission and Control of Meningococcal Infections; The Control of Meningococcal Meningitis by Mass Chemoprophylaxis with Sulfadiazine; Mumps and Chickenpox as Air-borne Diseases; Summary of a Three-year Study of the Clinical Applications of the Disinfection of Air by Glycol Vapors; Experimental Air-borne Tuberculosis; The Present Status of Glycol Vapors in Air Sterilization; Recent Studies on the Control of Dust-borne Bacteria by Treatment of Floors and Bedclothes with Oil; Sampling Devices; and Measurement of Air-borne Infection by the Disinfection of Air.

SAFETY ENGINEERING COURSE OFFERED FEDERAL WORKERS: The Federal Interdepartmental Safety Council has announced a course on Fundamentals of Industrial Safety Engineering which is offered to qualified government workers from May 7 to August 17 at George Washington University.

POSITIONS FOR INDUSTRIAL HYGIENIST AND CHEMICAL ENGINEER: Positions are open for an industrial hygienist and a chemical engineer in the Division of Industrial Hygiene, Arkansas State Board of Health. Salary for each position is from $3,000 to $3,600 per year. There is also a position of chemical engineer open with the newly-established industrial hygiene service in Wyoming, and a position of chemist with the Division of Industrial Hygiene of the Ohio Department of Health.

Activities Among the States

CALIFORNIA: Study of methyl bromide fumigation by the Bureau of Adult Health, State of California Department of Public Health, continued in the last month with investigation of a number of packing houses, reports DR. HAROLD T. CASTBERG, Chief of the Bureau. Several plants were found in which fumigating chambers were constructed of materials not impervious to methyl bromide, and a number in which the charging apparatus leaked badly while in use, allowing high concentrations of gas to reach the operator. Recommendations included use of a greaseless packing compound. . . . CARBON monoxide investigations made by the Bureau of Adult Health included study of this hazard in a cold storage warehouse where gasoline-powered vehicles are used for moving fruit into storage rooms which could not be ventilated because of the necessity of maintaining constant temperatures. It was recommended that electrically-powered vehicles be used to eliminate dangerous concentrations of carbon monoxide. . . . CONDITIONS in all forge and foundry plants visited last month in compliance with the request of the U. S. Public Health Service were found to be good, reports the Bureau of Adult Health. . . . ADDITION to the

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Bureau of Adult Health staff of MR. BYRON HUBBARD, as Assistant Industrial Hygiene Chemist, has permitted the laboratories to make a greatly increased number of investigations last month, reports DR. CASTBERG. . . . THE Bureau of Adult Health distributed 15,452 pieces of industrial health literature to plants and health departments in February.

LOS ANGELES: A great increase in demand for dermatitis preventive and corrective advice was noted last month by the Division of Industrial Hygiene of the Los Angeles City Health Department, and is attributed to a questionnaire sent by the Los Angeles Chamber of Commerce to industrial establishments in the area. In most plants investigated, dermatitis was found to be a problem, but in no case was it of epidemic proportions. A bulletin dealing briefly with the causes and prevention of industrial dermatitis has been prepared by the Division. . . . NEED for a city-wide survey and study of the shoe manufacturing industry is indicated by the finding of volatile solvent hazards in a number of such plants during the past month, reports the Los Angeles City Division of Industrial Hygiene. Solvent studies were made also in aircraft, flare, decalcomania, and waxed paper manufacturing establishments. . . . SERIOUS asbestosis hazards were found in all departments of a plant manufacturing pipe insulation, investigated at the request of the California Industrial Accident Commission, reports DR. D. C. MACPHERSON, Director of the Los Angeles City Division of Industrial Hygiene. Recommendations made included local exhaust ventilation, general ventilation, and improved plant housekeeping. . . . A SUBSTANTIAL drop in the incidence of fish conjunctivitis cases in the Fish Harbor area during 1944 is reported by the Los Angeles City Division of Industrial Hygiene. The total was 140 cases, as compared with 662 cases which were reported in the epidemic year of 1940.

COLORADO: To enlist the support of industry in a mass x-ray survey of Boulder County, inspectors of the Division of Industrial Hygiene of the Colorado State Health Department, visited most of the industries in this county last month. Appointment schedules and literature were left at each mine and plant. Inaccessibility of the mines and small industries of this area precluded x-ray on the job by the health department's mobile unit, and so the work was done by individual appointment after working hours at four central points. As a result of educational activities by union officials and management, response from the miners and industrial workers was extremely gratifying, reports AUGUST T. ROSSANO, JR., Director of the Division of Industrial Hygiene. . . . A VISIT at the Remington Arms Company medical department, at its Denver plant, featured the March meeting of the newly organized Colorado Industrial Nursing Association. The meeting, attended by public health and Army personnel as well as many industrial nurses, heard DR. L. V. SAMS, medical director of the plant, and the supervising nurse, who explained the company's accident and sickness record system.

IOWA: An occupational disease compensation bill has been introduced in both houses of the Iowa State Legislature. Members of the staff of the Division of Industrial Hygiene acted as consultants to the legislative committee which prepared the bill. . . . IN THE mass x-ray campaign to locate tuberculosis among Iowa's industrial workers, 29 plants already have been surveyed, reports the Division of Industrial Hygiene.

MICHIGAN: Uses, physical and chemical properties, and toxicology of chemicals recently developed for military and industrial purposes were described by WILLIAM G. FREDRICK, Chief Chemist of the Bureau of Industrial Hygiene, Detroit Department of Health, at the meeting of the Michigan Industrial Hygiene Society held March 28 in Detroit. . . . THE third annual Postgraduate Industrial Medical and Surgical Conference sponsored by the Committee on Industrial Health of the Michigan State Medical Society in cooperation with the Department of Postgraduate Medical Education of the University of Michigan was held April 5 in Detroit. The morning session included discussion of the problems arising from Michigan's new compensation law, and a presentation of the treatment and prevention of silicosis with aluminum powder. The afternoon session was devoted to a symposium on postwar problems in industrial health and medicine.

MINNESOTA: DR. L. W. FOKER, Director of the Division of Industrial Health, Minnesota Department of Health, has been appointed chairman of the Minneapolis Board of Examiners of Fumigators, which determines qualifications of applicants for fumigators' licenses. G. S. MICHAELSON, Chief Engineer of the Division, has been made a member of the Board. . . . INDUSTRIAL dusts and fumes and methods for their control were discussed April 6 by DR. FOKER at a meeting of the Northwest Chapter, American Society of Safety Engineers. . . . A TWO-DAY institute on industrial nursing was presented April 6 and 7 by the Center for Continuation Study of the University of Minnesota. Lectures on ophthalmology and industrial surgery, and a panel discussion on industrial nursing problems, were included in the program. . . . DR. L. W. FOKER and other special lecturers will participate in a course on industrial health problems to be presented by the School of Public Health and the General Extension Division of the University of Minnesota during the spring quarter.

MISSOURI: A symposium on medical, engineering, chemical, legal, and administrative problems of industrial hygiene was presented April 4 by members of the Division of Public Health Engineering and Industrial Hygiene to all governmental industrial hygiene personnel in Missouri, reports DR. A. LINK KOVEN, chairman of the Missouri Governmental Industrial Hygienists. So much interest was expressed that the proceedings have been reproduced, to be available upon request. . . . HAVING found high concentrations of cadmium fumes in several plants of the state, the Industrial Hygiene Service of the Missouri State Board of Health is testing the efficiency of aluminum instead of cadmium wire for use in silver soldering. A survey of the cadmium hazard in all silver soldering operations in the state is being made. . . . THE medical importance of aluminum dust was discussed recently by DR. DUDLEY IRWIN, medical director of the Aluminum Company of America, in a meeting sponsored jointly by the Kansas City Area Industrial Hygiene Service of the State Board of Health, the Kansas City Health Department, Jackson County Medical Society, Kansas City Industrial and Railway Physicians and Surgeons, Kansas City chapter of the American Society of Safety Engineers, and the Kansas City Industrial Nurses' Club. . . . DR. IRWIN gave a short series of lectures, sponsored and planned by the Kansas City Area Industrial Hygiene Service of the State and the City Health Department, to several groups before the meeting.

ST. LOUIS: Educational materials have been prepared and other preparations completed by the Industrial Hygiene Service of the St. Louis City Division of Health in cooperation with other Health Division officials for the initiation of a tuberculosis control program in the industrial establishments of that area.

NEW JERSEY: Approximately 300 Bloomfield, New Jersey, industrial workers were examined in a health maintenance survey conducted recently by the Bureaus of Industrial Health and Venereal Disease Control of the State of New Jersey Department of Health, in a demonstration project sponsored by the Greater Newark CIO Council and the United Electrical, Radio and Machine Workers of America, Local 410. Examination consisted of chest x-ray, blood pressure and heart examination, and blood test for syphilis. Assistance was given by the Bloomfield Health Department. . . . A GROUP of plants having cases of occupational dermatitis were visited recently by staff members of the Dermatoses Section, Industrial Hygiene Division, U. S. Public Health Service, together with members of the Bureau of Industrial Health of the State Department of Health and a member of the State Department of Labor. Plants visited included manufacturers of or-

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ganic and inorganic mercurial compounds, vitamin preparations, cashew nut shell oil products, and cast iron piston rings. . . . THE Industrial Nutrition Committee of Essex and West Hudson Counties held a meeting in Newark March 28, at which talks on the determination of nutritional deficiencies in workers and the relationship of industrial toxins to nutritional needs of workers were presented. . . . HEALTH effects of solvents were discussed at a meeting of students in Newark March 28, who took the courses in industrial hygiene engineering given recently by Rutgers University in cooperation with the Bureau of Industrial Health.

NEW YORK (Long Island City): The Office of Industrial Health is urging industrial nurses of Long Island City, New York City, and vicinity, to attend a series of six lecture-discussions on problems of industrial nursing to be held on successive Monday evenings, starting April 9, and sponsored by District 14 of the New York State Nurses' Association. Subjects covered will be tuberculosis, syphilis, emotional problems, legal aspects of nursing, minors and women in industry, rehabilitation, and placement of the substandard worker.

SOUTH CAROLINA: A mass survey of tuberculosis in all industrial establishments of the State will be sponsored by the Industrial Committee of the South Carolina Tuberculosis Association, announces the Division of Industrial Health of the State Board of Health. The survey is being conducted by counties, with county health departments assisting in promotion and in making final arrangements with industries. Consultant nurses of the Division of Industrial Health will give full assistance to the county health departments. The program calls for photofluorographs of all industrial employees, follow-up of all suspicious or positive cases by the health department, assistance to industry in placing certain employees in protected work, and assistance to private physicians in the isolation of open cases found.

TEXAS: Assistance has been given by the Industrial Hygiene Section of the Texas State Board of Health in formulation of a research project on typhus fever control soon to be undertaken in a Texas county. . . . MEMBERS of the Industrial Hygiene Section demonstrated industrial hygiene equipment at the Texas Sanitarians' Institute held recently in Austin. . . . AT THE request of the Fort Worth City Health Department, the Fort Worth Safety Council, Chamber of Commerce, and Tarrant County Health Department, a special study and survey were made recently on the health and safety of industrial workers in that city. . . . HEALTH and safety hazards in the water works field were discussed recently by a member of the Harris County Health Unit, in a water sanitation course conducted by the City of Houston.

WASHINGTON: A procedure has been devised by the Industrial and Adult Hygiene Section, Division of Preventive Medical Services of the State of Washington Department of Health, for the rapid determination of the hexavalent chromium content of welding fumes from coated stainless steel electrodes. The high proportion of toxic hexavalent chromium found in stainless steel welding fumes may account for symptoms reported as having resulted from inhalation of these fumes. . . . EVALUATION of occupational health hazards in six district garages of the State Department of Highways was made recently by the Section of Industrial and Adult Hygiene. A severe carbon monoxide exposure was found in one garage. . . . AN EDUCATIONAL program for the industrial hygiene staff has been incorporated as a regular feature of the weekly conference of the Section of Industrial and Adult Hygiene, with discussion of timely subjects by staff members and review of current literature in the field. Cadmium poisoning, diatomaceous earth, and fluorescent lighting already have been discussed. Topics to be presented in the near future include hazards from fumigation in the pea-processing industry, mass tuberculosis X-ray in industry, carbon monoxide, and readjustment of the war veteran returning to industry.

PERSONNEL NEWS AND NOTES: Statistician VICTORIA M. TRASKO of the Industrial Hygiene Division, U. S. Public Health Service, has just returned from a visit to Lansing and Detroit, Michigan, Chicago, and Minneapolis, where she reviewed the recording and reporting procedures of the industrial hygiene agencies with a view toward standardization of these processes. She will visit other industrial hygiene units, at their request. . . . SENIOR DENTAL SURGEON (R) L. D. HEACOCK, Chief of the Dental Unit, Industrial Hygiene Division, U. S. Public Health Service, recently visited Wilson Dam, Alabama, to help plan improvement in the dental features of the industrial hygiene program for workers in the chemical plant there. . . . MANY conferences with industrial nursing consultants and public health nurses were held by NURSE OFFICER (R) F. RUTH KAHL, Chief of the Nursing Unit, Industrial Hygiene Division, U. S. Public Health Service, in a recent visit to New York State. . . . SURGEON (R) W. E. DOYLE is at present evaluating the industrial hygiene problems in the States comprising Public Health Service District No. 1. He has already visited the States of Vermont, New Hampshire, Massachusetts, Connecticut, and Rhode Island, and is now on [illegible] District, covering the States of New Jersey, Pennsylvania and its various branch offices, and the Syracuse, New York, branch office, of the New York Division of Public Health. . . . MISS GRACE BALLARD, R.N., B.S., has joined the Division of Industrial Hygiene, Illinois State Department of Public Health, as Industrial Nursing Consultant. For the past four years she served as industrial nursing consultant with the Employers Mutual Liability Insurance Company. . . . NEWLY appointed to the Division of Industrial Hygiene, Illinois State Department of Public Health, are CLAUDE ROMINE, JR., and LORRAINE S. SCHMIDT, Industrial Hygiene Chemists, and FRANK J. COLE, Industrial Hygiene Engineer. . . . ARTHUR ERICKSON is newly appointed Chemists' Aide with the Division of Industrial Health, Minnesota Department of Health.

TEN YEARS AGO in INDUSTRIAL MEDICINE

W. . . VON OETTINGEN, M.D., DR.P.H., in "Toxic Gases and Vapors—Hazards and Control," in INDUSTRIAL MEDICINE, 4: 5, 245, May, 1935: "Of all accidents of poisoning in our daily life and in industry, those caused by the inhalation of vapors and gases exceed all others in number and frequency. Since in our homes the use of illuminating gas and of automatic refrigeration, using different volatile materials, has become general, the number of poisonings from such gases and vapors has increased considerably and at times has reached an alarming height. The use of the automobile and the vast consumption of gasoline have caused a consequent rise in the incidence of carbon monoxide poisoning. Furthermore, the extensive use of dry cleaning fluids, lacquers and varnishes, paint removers and similar preparations bears a permanent danger to health and life, if improperly used. In our industries the constantly increasing number of solvents and solvent mixtures offers new problems, not to mention the numerous vapors and gases of different natures which are being produced in the course of various chemical processes. Such accidents may appear to be quite harmless, resulting in headache and moderate disturbances, but with continued exposure these may cause severe and permanent injury. The exposure to more toxic agents or to higher concentrations of less harmful compounds, may immediately cause severe injury and may even result in fatal accidents. For this reason it appears to be of paramount importance that we be familiar with the potential dangers resulting from the handling of such compounds under different conditions so that we can plan adequate prophylactic measures and devise the proper treatment for injuries resulting from the exposure to such toxic agents."

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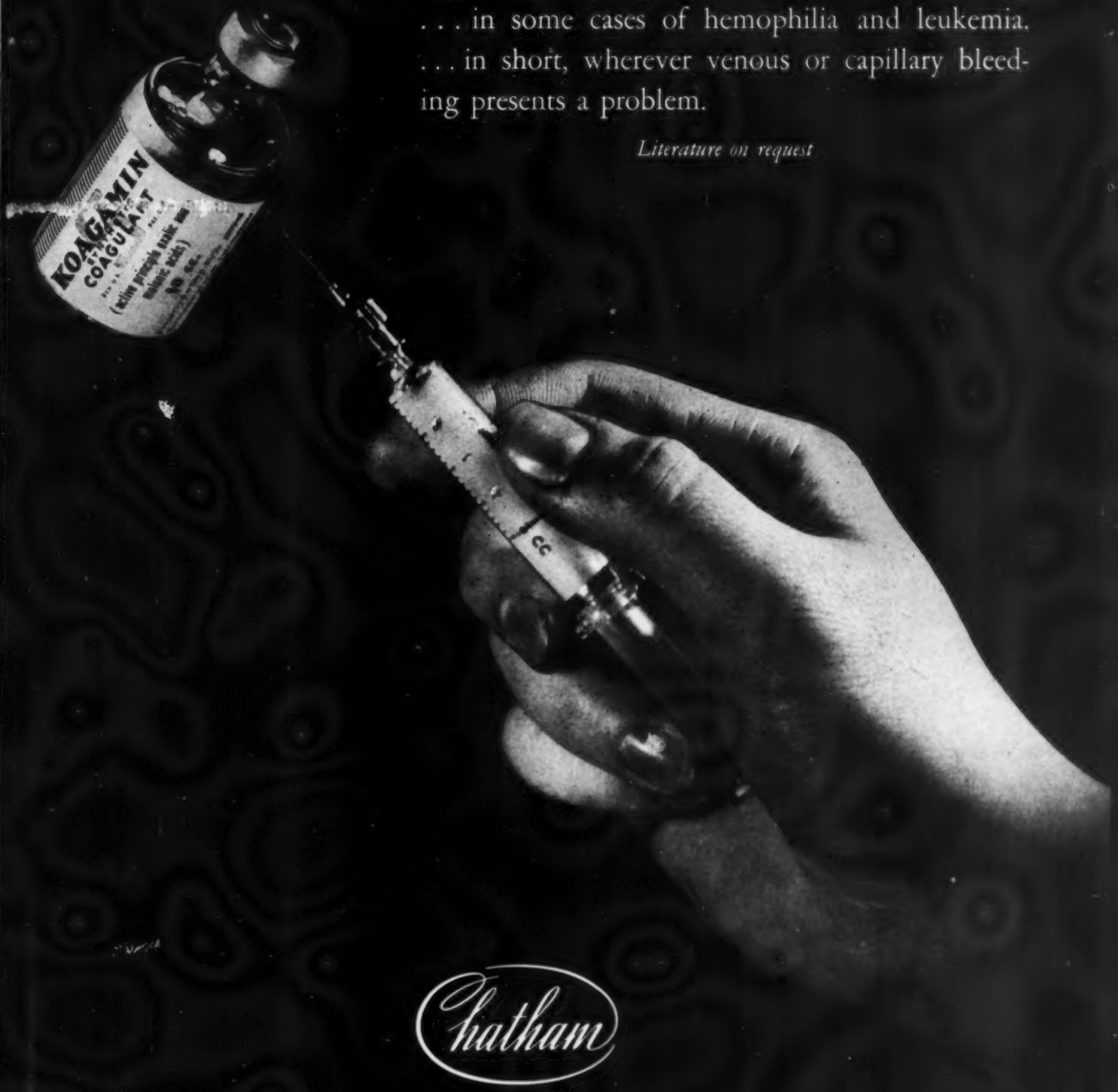

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